City of Carlsbad

Trails Master Plan

FINAL DRAFT - February 2015

Prepared for:

City of Carlsbad

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Chapter 1

Introduction

1 Introduction

1.0 Overview

Carlsbad is an affluent seaside resort community occupying a 7-mile stretch of Pacific coastline in North San Diego County, California. Located approximately 35-miles north of downtown San Diego, it is referred to as "The Village by the Sea" by locals. Carlsbad's Mediterranean climate attracts visitors year-round and supports an active sports community where numerous world class athletes train and live. The many healthy, active life style opportunities in Carlsbad attract families and businesses to this vibrant seaside community.

Carlsbad is as much a way of life as it is a city. A way of life that is focused on the beaches, lagoons and hillsides and how the community utilizes these places. The community is proud and protective of a quality of life that is connected to its environment.

Trails connect Carlsbad citizens and visitors to its beaches, coastal resources and activities as well as to the city's 3 unique lagoons: Buena Vista; Agua Hedionda; and Batiquitos. The trails provide access to and public education of the diverse and natural resources and result in an increased sensitivity and respect for nature and wildlife. ***Trails connect people to nature.***

Trails support physical activity for residents and visitors alike. Some of the best forms of exercise are walking, hiking, jogging, running or cycling. ***Trails connect people with their physical well being.***

Healthy forms of activity are not only providing exercise, but also providing opportunities for residents and visitors to connect to various destinations throughout the city. ***Trails connect people to their community.***

Trails encourage social interaction and improved opportunities for community connectivity. ***Trails help connect people with people.***

Figure 1.1: Vicinity Map

1.1 Project Study Area

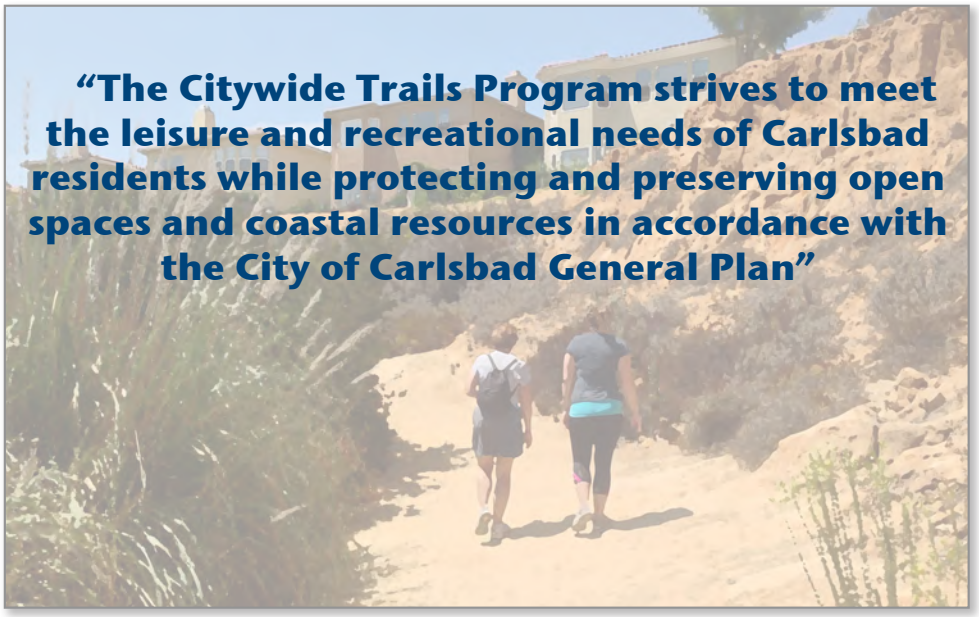
The study area includes all of the City of Carlsbad and focuses on the open space, parks, beaches and the recreation and circulation trail system that connects them (see"Figure 1.1: Vicinity Map") .

1.2 Trails and Active Transportation Strategies

Trails often also provide a transportation function by providing non-vehicular modes of moving about the city. The concurrent Carlsbad Active Transportation Strategy (CATS) plan is being coordinated with this trail planning effort. Although thought of as being supportive of just recreational activities, certain trail segments provide a link to important destinations in Carlsbad - destinations such as golf courses, the flower fields, Legoland, nature centers, nature preserves, schools, work, shopping areas, restaurants, or recreational areas. ***Trails connect people with destinations via non-motorized transportation options.***

1.3 Citywide Trails Program Mission Statement

The primary purpose of the Carlsbad Citywide Trails Program is provided in the mission statement below:



1.4 Trails Master Plan Purpose

This plan will build on the previous efforts completed by staff, volunteers and private development partners completed over the past 2 decades for Carlsbad's vibrant citywide trails program. Since the Open Space Conservations Resource Management Plan (OSCRMP) was approved in the mid 1990's, until this current undertaking, much of the trail system was made possible via many satellite policies and planning efforts. This update for the trails planning in the city will provide a comprehensive planning document to reference for developing and maintaining the city's trail system into the future and takes into consideration both the larger public and private projects more recently underway in the coastal corridor and opportunities to see some of the trails developed along with the Carlsbad Active Transportation Strategies program. Important east/west connections around the city's major lagoons out to the Pacific Coast and how those are envisioned to come to fruition are also identified in this plan. This plan refines the original trails master plan outlined in the OSCRMP as a backbone for the trail system in the city's open space areas and how it, can be taken further to provide a truly unique trail destination system once areas in the coastal corridor are fully developed, while at the same time providing "near home" trail use for all residents of the city by providing the full trail system connectivity to the whole community.

1.5 Document Organization

Below is a summary of what each chapter provides as a way to assist in finding general topics relating to the development of the document.

Chapter 1: Introduction (this chapter)

This chapter provides an overview as to why the "Trails Master Plan" is being updated and includes the citywide trails program objectives, and Mission Statement.

Chapter 2: Project Background

Many planning efforts in the past have been responsible for the development of the extensive trail system that currently exists in Carlsbad. A strong foundation has been created in many planning documents. This chapter discusses these efforts and summarizes the goals and policies that are relevant to trails.

Chapter 3: Public Outreach Summary

Public input on this plan included an on-line survey, as well as an on-line mapping tool that was used by the general public to identify locations in Carlsbad that represent concerns or opportunities. A public open-house and workshop was conducted to obtain additional input. This chapter summarizes the key findings from the public outreach conducted for the Trails Master Plan Update.

Chapter 4: Trail Types Defined

This chapter describes six trail types including trail surfaces for them. Explicit details of these trail types, with photo examples and diagrams for them are included in this chapter.

Chapter 5: Analysis of Existing Conditions

One goal of this plan is to provide an equitable distribution of recreational trails throughout the sub-areas of Carlsbad. This chapter looks at the connections between trails, open spaces, park facilities, neighborhoods, businesses and other destinations and identifies connectivity associated with these linkages.

Chapter 6: Future Trail Recommendations

This chapter is the main focus for all future trail development in the city. Recommendations for expanded trail facilities, and construction of open space trails and trails associated with the CATS, are made in this chapter.

Chapter 7: Trail Standards

The proper layout, materials and construction of trails are paramount in providing a positive trail user experience. Safety, convenience and amenities are discussed in this chapter, along with geometric requirements of width and gradient along with trail amenities (signage, fencing, and seating).

Chapter 8: Trail Maintenance and Operations

Maintenance requirements and standards as well as methods to encourage the volunteer community to assist with maintenance and operations for the trails, is a focus of this chapter.

Chapter 9: Funding Opportunities

Opportunities to leverage private and public funds with grants and other various sources of trail funding are discussed in this chapter.

Appendix A- Public Input

Chapter 4 provided a summary of the public input obtained on this project. This section provides the documentation of all input received, as well as the categorization of general themes and primary suggestions that the public input identified.

Chapter 2

Project Background

2 Project Background

The City of Carlsbad has been working for many years to develop and implement a comprehensive trails system. As early as the early 1990s, residents recognized the natural beauty of the many open space areas and the city's three large lagoon and wetland areas as desirable recreational opportunities. Over the years, several important planning documents consistently provided guidance during growth of the city to ensure that the unique natural resources were protected and yet available for enjoyment by residents and visitors to the Village by the Sea.

Several important planning documents that have provided guidance for the trail development are presented below to provide context on how the trails system has developed to date.

2.1 Previous Planning Efforts

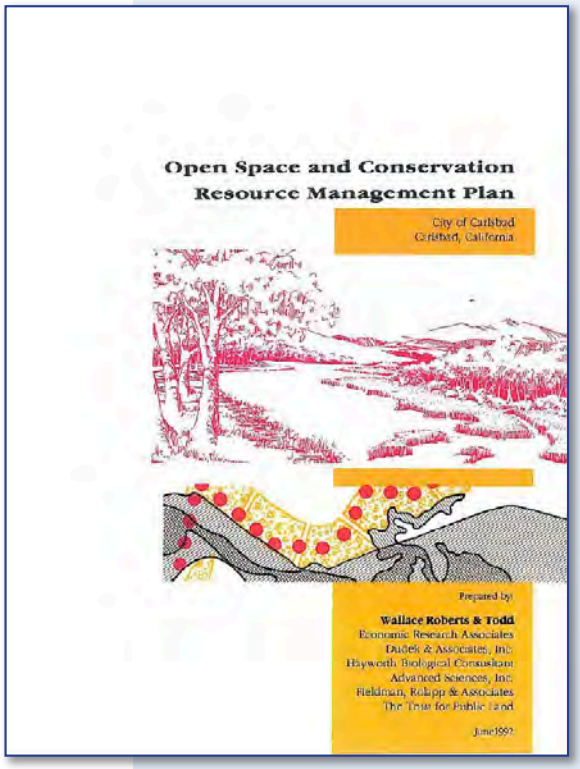
Trails Feasibility Study

Beginning in 1990, a Trails Feasibility Study laid the groundwork for planning trails within the city. The alignments came out of efforts provided by an Open Space Ad Hoc Committee appointed by city council to advise on the development of an open space trail system.

The Open Space and Conservation Resource Management Plan expanded upon the study and provided conceptual trail alignments used to plan the city's trail network.

Open Space and Conservation Resource Management Plan (OSCRMP)

The Open Space and Conservation Resource Management Plan (1992) provided the framework for the city's trail development to date as the conceptual alignments laid out for the system were utilized as the city was rapidly developing in the 1990's up to present times. Specific trail links were identified that were conceptual in nature and flexibility allowed fine tuning as private and public opportunities for development occurred. The plan was intended to protect the open space resources and landscape identity of the City of Carlsbad while allowing for growth opportunities identified in the city's long-range plans. The plan defined a program for implementation of an integrated open space and trails system incorporating:



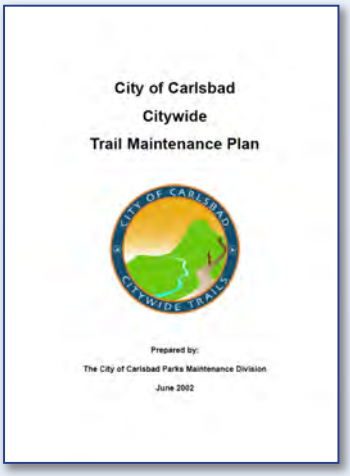
- Open space for the preservation of natural resources, such as wetlands and other valuable habitats;
- Open space for the managed production of resources, such as agricultural lands;
- Open space for outdoor recreation, including parks and other open space recreation areas;
- Open space for aesthetic, cultural and educational purposes, including key scenic and cultural resources;
- Open space for public health and safety, such as floodways; and
- Open space for the proposed Carlsbad Trail System.

Citywide Trails Program Report

In 2001, the City Council approved the Citywide Trails Program Report which outlined the future vision and immediate steps to be taken to implement what was commonly referred to for the next decade as the Citywide Trails Plan. The report outlined ambitious steps to make available more trails to the public and offered up a new classification of trails aligned with the Circulation Element of the General Plan, and referred to as Circulation Element Trails. The report identified approximately 14 miles of existing recreational trails at the time and approximately 5 miles of circulation element trails more commonly referred to today as Class 1 multi-use trails by transportation standards. The report also outlined next steps for the city to prepare and put in place policies for plan review, Trail IOD acceptance, and maintenance and operations standards.

Citywide Trails 5 Year Implementation Plan (2002)

In 2002 as part of ongoing efforts to Implement the Citywide Trails program, a city goal team prepared a 5-year work plan that identified which city trail segments would be accepted (previously privately maintained and used) and built over the next 5 years, both as part of private development and by the city. Funding options and the implementation of a city trail volunteer program were also identified as goals for carrying out the 5 year work plan. In February of 2002 the city council approved funds for the Citywide Trails Program and maintenance be allocated from the General Fund (AB 16,55).



Citywide Trails Maintenance Plan (2002)

Objectives

- Proper maintenance of citywide trails.

Policies

- City will be responsible for signage and markers, fencing, dog waste receptacles, trail amenities and edging materials.
- City is not responsible for landscape/irrigation off the trail, drainage if part of HOA or private residential area.

2.2 Recent and Current Planning Efforts

General Plan - Open Space & Conservation Element (2006)

Goals:

III.A.1 – A city with open space areas connected by Greenways.

III.A.2 – A city with a Carlsbad Trail System.

Objectives:

III.B.1 – To ensure that there is continuity and environmental sensitivity in the routing and design of the trail system.

III.B.2 – To route trails near environmentally sensitive areas only with appropriate buffers or fencing.

III.B.3 – To provide trails that serve as pedestrian and bicycle transportation between residential and commercial areas.

III.B.4 – To develop and implement Financing Mechanisms for the acquisition, construction, and maintenance of the Citywide greenway and trail system.

III.B.5 – To finance, manage, and acquire land for a Carlsbad Trails System.

Bikeway Master Plan (2007)

Policies:

1.1.2 Coordinate the location of bicycle routes with the Parks and Recreation Element and the Open Space and Conservation Element.

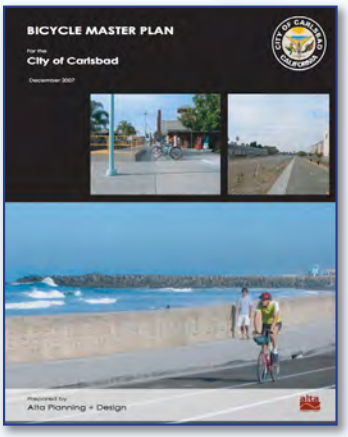
1.1.3 Extend bicycle routes to cultural, educational and recreational facilities.

1.1.5 Improve bicycle access to beach areas.

1.1.7 Encourage passive and active use of the railroad right of way as a trail linkage and bicycle pathway.

1.1.6 Seek funding for bicycle transportation through regional, state and federal funding programs.

1.1.7 Install trail systems within existing and new industrial developments.



Pedestrian Master Plan (2008)

Goals:

3.4.1.1 – A city with neighborhoods that have a sense of community where residents, including children, the disabled and the elderly, feel safe and comfortable traveling to daily destinations; where homes and trees line the streets; where central gathering places create focal points; and where recreation areas are provided for a variety of age groups.

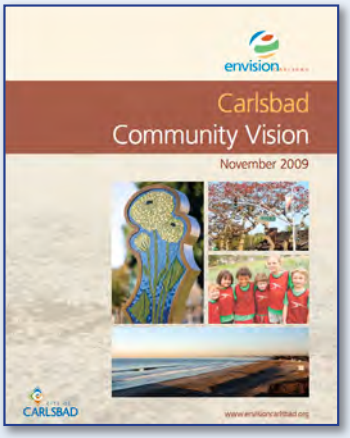
Objectives:

3.4.2.1 – To ensure that new development is designed with the focus on residents instead of the automobile by providing: pedestrian-friendly, tree-lined streets; walkways to common destinations such as schools, parks and stores; homes that exhibit visual diversity, pedestrian-scale and prominence to the street; and recreation amenities for a variety of age groups.

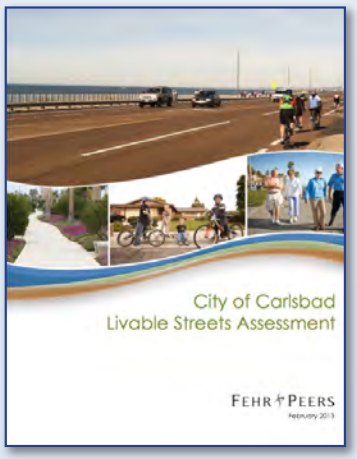
3.7.2.1 – To encourage the use of the excess railroad right-of-way for landscaping, parking facilities, recreation areas, trails and similar uses.

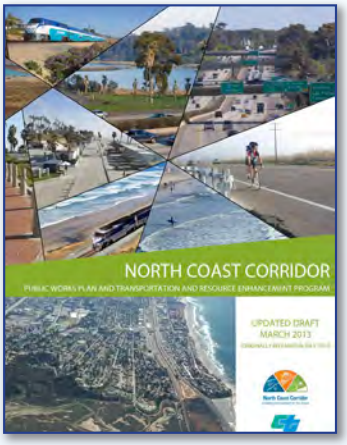
Carlsbad General Plan

The Carlsbad General Plan update will be adopted in early 2015 by the city. Prior to this, the last comprehensive update was completed in 1994, with an update to the Circulation and Land Use Elements in 2004. The updated Mobility Element changes the typical circulation paradigm to focus on Livable Streets. Whereas the 2004 Circulation Element encouraged alternative transportation within the city under its own set of policies, the updated Mobility Element focuses on multi-modal transportation as a major tenet of the General Plan, with the majority of policies having a multi-modal focus. As such, the dialogue between alternative transportation and automobile travel are intertwined throughout the document. The following three core values are part of the nine core values that relate to this trails master plan:



- Prioritize protection and enhancement of open space and the natural environment. Support and protect Carlsbad's unique open space and agricultural heritage.
- Promote active lifestyles and community health by furthering access to trails, parks, beaches and other recreation opportunities.
- Increase travel options through enhanced walking, bicycling, and public transportation systems. Enhance mobility through increased connectivity and intelligent transportation management.





2.3 Important Future Transportation Plans with Trail Projects

North Coast Corridor Public Works Plan/Transportation and Resource Enhancement Program (PWP/TREP- 2014)

Caltrans and SANDAG have prepared the NCC PWP/TREP to function as a single integrated document for comprehensively planning, reviewing, and authorizing the NCC's transportation, community, and resource enhancement projects within the NCC extending from La Jolla to Oceanside along the North San Diego County coastline. The NCC PWP/TREP creates a framework within which identified projects can be analyzed and implemented over the next 30 to 40 years under a coordinated plan. Altogether, the proposed NCC PWP/TREP is a multi-modal transportation program that would implement a variety of improvements (highway, rail, bicycle, pedestrian) to meet the NCC's different transit needs. The non-highway improvements would increase capacity within the corridor; however, even collectively, they would not be able to accommodate projected corridor travel growth or avoid improvements to the I-5 corridor that will be critical to maintaining an efficient, uncongested transportation system in the NCC that meets all of the travel demands of residents, commuters, visitors, and goods movement. The suite of projects included in the NCCPWP/TREP represents the mix of infrastructure improvements that would best achieve the transportation goals of the project while avoiding and minimizing impacts to sensitive coastal resources, including wetlands.

Many of the corridor's existing bicycle paths and pedestrian trails are fragmented due to topographical and infrastructure barriers; however, the proposed bicycle and pedestrian improvements would create or substantially improve many of these necessary connections, including 26 highway over- and under-crossings that would be reconstructed with improved facilities. These pedestrian bridges and enhanced sidewalks/bike lanes would provide safe, non-automobile-dependent routes to and within the Coastal Zone.

North Coast Bike Trail

A key component of the NCC PWP/TREP is the proposed North Coast Bike Trail, a new facility that would run the entire 27 mile length of the NCC, roughly parallel to Interstate 5. It would consist of both separated and shared bicycle facilities, located partially in the I-5 right-of-way and partially on adjacent city streets. Caltrans is continuing to work with local jurisdictions to determine the preferred alignment for this shared facility. As part of the highway construction, Caltrans would complete those portions of the bikeway that fall within the I-5 right-of-way, and coordination with local jurisdictions would ensure connectivity to trail segments outside of the highway R.O.W.

Coastal Rail Trail

The Coastal Rail Trail is a dedicated bicycle facility in the region's coastal corridor, with most segments in or adjacent to the LOSSAN rail right-of-way. Once fully completed, the Coastal Rail Trail would provide a continuous north-south bicycle route—mostly comprising Class I facilities—through the NCC with direct access to coastal resources and recreational facilities. Caltrans and SANDAG have identified opportunities to complete approximately seven miles of the Coastal Rail Trail within the LOSSAN rail right-of-way as part of the NCC PWP/TREP improvements. These segments also will contribute to the completion of the California Coastal Trail, a planned 1,200-mile public right-of-way spanning the entire California coastline.

The Coastal Rail Trail segments planned in the NCC PWP/TREP—all of which are immediately adjacent to the coast—will support the development of the California Coastal Trail in the NCC by providing additional options for non-motorized travel along the coast.

2.4 A Vision for the Future

The vision statement is shown on Figure 2-1. The vision was development based on comments received from the public as part of the public outreach process for the Carlsbad Active Transportation Strategies plan and Trails Master Plan.

Taking the Right Steps

The Carlsbad Trails Master Plan includes a program vision and supporting goals that are intended to provide guidance for future decisions related to trail development in Carlsbad. The goals are a set of overarching principles that are used to guide decision making. Objectives are specific, measurable steps that can be taken to meet the goal. Together, goals and objectives can help achieve the vision for the future of the Carlsbad trails system.

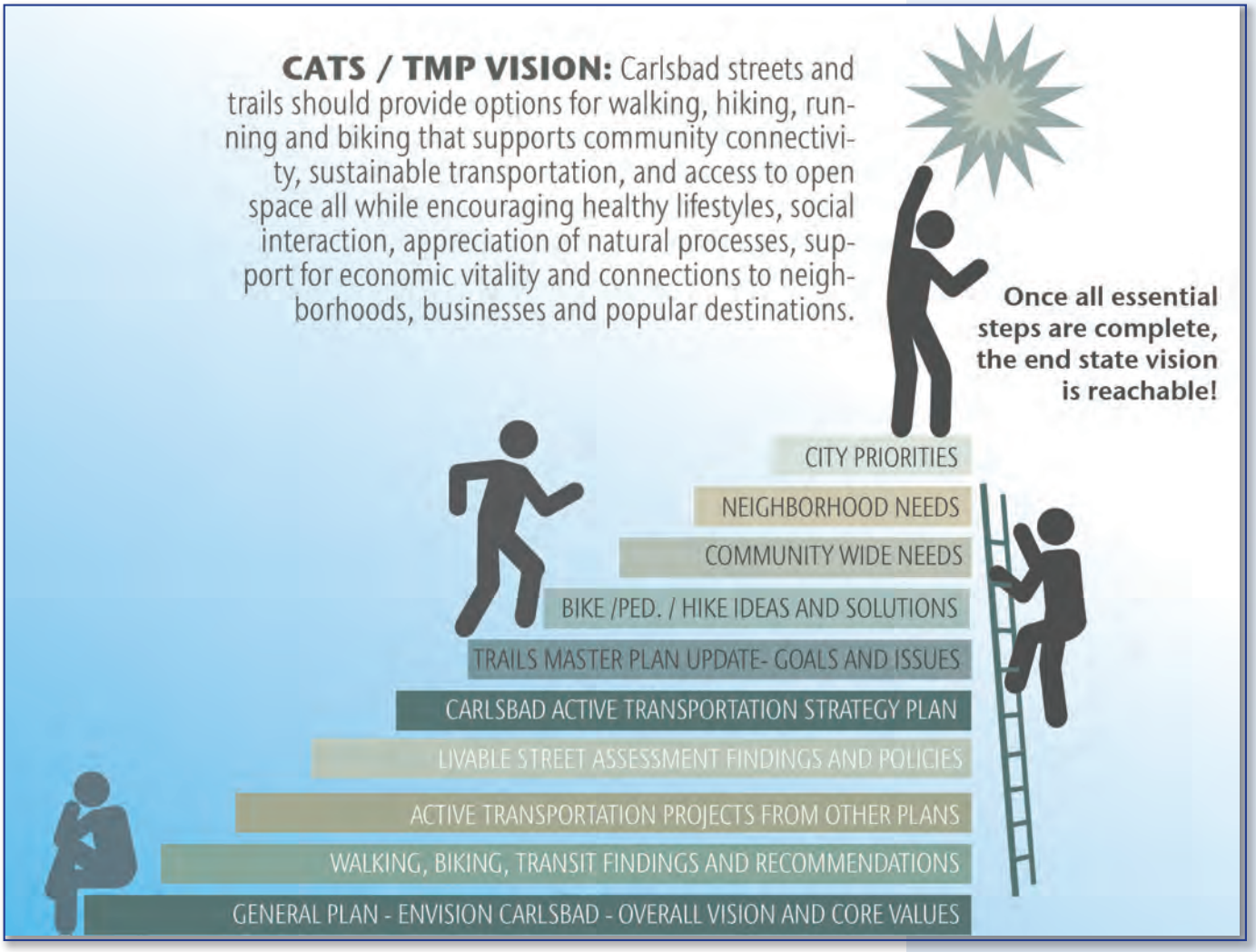


Figure 2.1: Steps Needed for Reaching the Public's Vision

2.5 Trail Master Plan Goals

As a result of the public workshop and surveys, the project team assembled the following major goals related to the project vision statement. These Include:

1) Create a Connected and Complete Trails System

- Complete trail segments that close gaps in the current trails system. It is important to not only connect a localized group of trails, but to connect different subareas in Carlsbad with each other, including the three lagoons, open space, canyons and hillsides.
- Develop trails that connect different segments together to create loops. Loops are preferred by trail users and they limit the amount of cut-through trails that can create potential environmental problems. Loop systems will require connectivity via use of sidewalks, roadside trails or bike lane or bike route facilities.
- Provide a well distributed trail system that serves all sub-areas of Carlsbad with close and convenient access to the centers of residential development, tourist facilities and other activity centers. A well distributed system is not only equitable but it increases the chances of residents walking or biking within the subarea.

2) Accommodate a Variety of Trail Users in a Safe and Environmentally Sensitive Manner

- Continue to develop multi-use trails that support a variety of users.
- Identify areas of conflict between trail use and adjacent land uses or sensitive habitats and provide for design guidelines or other measures to reduce these conflicts.
- Educate trail users on the importance of trail etiquette, as well as the importance of sensitive habitat in an effort to gain respect for protection of sensitive habitat areas.

3) Identify Existing & Future Trail Development (Refer to Appendix B)

- Identify future trail opportunities associated with private development early and continue developing private partnership opportunities to develop citywide trails system.
- Continue to require major developments to dedicate public trail easements that provide the broader community connectivity for residents, tourists and visitors alike.
- Consider the direct purchase of important access and trail connections where necessary to provide important trail connections when offers of dedication may not be feasible or granted to maintain the publics access for critical and vital connections of the trails system.

4) Integrate Transportation Related Facilities as Part of the Trails System

- Recognize and consider the use of on-road and near-road walking and bike facilities to be part of the trail system as a way to encourage, healthy activity and alternate transportation opportunities that start at the “front door” instead of the “car door”.

Chapter 3

Public Outreach Summary

3 Public Outreach Summary

This chapter summarizes the public input that was collected for the City of Carlsbad's Trails Master Plan (TMP) and Comprehensive Active Transportation Strategy (CATS) projects. The reviewer should note that some of this input is specific to the CATS project, but has been included here to determine if there are parts of the comments that may also apply to the TMP.

This chapter is arranged into four sections; the information contained in each section is described below:

1. ***Overview:*** Provides an overview of the public workshop and online survey, including the format of the meetings and ways that input was provided. Meeting attendance and number of comments shared through online survey are also described.
2. ***Focus Areas:*** Identifies areas and specific locations that were frequently identified during the public workshop and online survey. A summary map of geographic-specific comments is included.
3. ***Major Themes:*** Provides a list of general themes that were identified through the public workshop and online survey. These themes are not related to a specific geographic location, but are general comments that are applicable throughout the city.
4. ***Appendices:*** Documents all the comments collected through the public workshop and online survey.

3.1 Overview

Public input for the City of Carlsbad's TMP and CATS projects was collected through a comprehensive public engagement process that included a public workshop and online survey. The public workshop was held at the City of Carlsbad's Faraday Center on February 26, 2014 from 6:00 to 8:00 pm and online survey was conducted from November 27, 2013 to February 28, 2014 through an online survey and interactive map that were available on the City of Carlsbad's website.

3.2 Public Outreach Purpose and Objectives

The purpose of the public workshop and online survey was to provide information to the public and stakeholders about the CATS and TMP projects, and to solicit feedback and comments to be considered when finalizing and prioritizing recommendations included in both plans. The meetings and online survey provided a forum for the public to share ideas, comments and concerns, and to identify geographic areas where improvements are desired. Specific objectives of the public workshop and online survey included:

- Providing an overview of the purpose, process, outcomes, and next steps for the CATS/TMP projects, including why the CATS and TMP are being coordinated.
- Working with the public to identify specific locations where physical improvements may be able to improve the safety, conditions, and experience for people who walk, bike, and hike in Carlsbad.
- Obtaining feedback from the public to help develop and prioritize recommendations for inclusion in the CATS/TMP.

3.3 Workshop Attendance and Participation

A total of 34 people attended the public workshop, 329 partial and completed surveys were collected; and 272 comments were shared on the interactive map. The number of comments collected from each public input strategy is presented below on "Table 3.1: Comments Received".

Table 3.1: Comments Received

Public Input Method	Number of Comments
Public Workshop	
Map Comments	53
Vision	22
Bike Facility Stars	84
Trail User Stars	101
Trail Type Stars	81
Comment Cards	26
Online Survey	
Partial Surveys	31
Completed Surveys	301
Online Interactive Maps	
Walking Map	107
Biking Map	130
Hiking/Trails Map	35

3.4 Public Workshop Format

The public workshop utilized an open house format with a presentation integrated into the meeting. The open house included display boards on different topics related to the TMP and CATS projects with maps and other activities designed to collect input from those who attended. Workshop participants had an opportunity to talk directly to city staff and consultants about the TMP and CATS projects, to view display boards, maps, fact sheets, and additional information. All display boards that were included in the open house are included in Appendix A. The fact sheet for the TMP and CATS projects is included in Appendix A as well.

At the beginning of the open house, the project team gave a presentation followed by a brief question and answer period. Although many people were able to provide comments on the open house boards prior to the presentation and talk with staff, workshop participants were able to participate in the open house process and provide comments following the presentation as well.

There were several ways that the public was able to provide input during the public workshop, including commenting on maps, comment cards, using sticky notes to comment on a vision statement for the TMP and CATS projects, and using colored stars to indicate items or topics the attendee liked. Notes were solicited to help prioritize suggested ideas for different bicycle and trail facilities and improvements. A record of the comments that were collected during the public workshop is included in Appendix A.

In addition, each person who attended the public workshop was given a comment card when they signed in to the meeting. The comment cards provided a way for the public to provide written comments and share ideas related to the TMP and CATS. All the comment cards and written comments that were submitted during the public workshop are included in Appendix A.

3.5 Online Engagement: Survey & Interactive Maps

The survey included 15 questions (multiple-choice, rating scale, open ended) related to walking, biking, and trail use in the City of Carlsbad. The survey also included demographic questions. Three interactive maps were also available for the public to provide comments on biking, walking, and hiking/trails in Carlsbad and their specific location within the city. The survey questions are provided in Appendix A, along with the survey results.

Geographic Area Summary

There were several specific areas in the city that received a large number of comments during the public workshop and online survey process. Below is a summary of major inputs based on geographic areas (see Figure 3.2 : Geographic Locations of Notes and Comments). Note the numbers below are keyed with Figure 3.2 to emphasize the geographic concentration of comments. Also to note on this Figure, the higher the number of comments, the darker red areas on the map will be shown.

1 ***Carlsbad Blvd:*** Many people shared a vision of Carlsbad Boulevard as a great place for walking, biking, running, pushing a stroller, using a wheelchair, or walking a dog along the entire length of the city's coastline. However, many people identified existing conflicts between different users on Carlsbad Boulevard that often create unsafe conditions for pedestrians and bicyclists. A large number of the comments addressed improving the segment of Carlsbad Boulevard from Cannon Drive to La Costa Avenue. Other comments included suggestions to extend the seawall and other user facilities such as restrooms and parking.

2 ***Interstate 5 and Railroad Corridor:*** Chestnut Street and the Coastal Rail Trail: The freeway and railroad tracks were identified as barriers to accessing the coastal area of the city. There were many suggestions for improved crossings, particularly over the railroad tracks at Chestnut Street. Other suggestions included freeway crossings at Batiquitos Lagoon, Agua Hedionda Lagoon, and Buena Vista Lagoon. Improvements at Palomar Airport Road, Carlsbad Village Drive, and Tamarack Drive were also commonly suggested. There was also support for completing the Coastal Rail Trail throughout the length of the city as a way to travel on a bike or by foot.

3 ***Lake Calavera:*** Lake Calavera was identified as an important open space area. Some comments identified it as a place with valuable recreational opportunities for bikers and hikers, while other comments described it as an important habitat area. Although different strategies for balancing recreation and conservation were suggested (including trail closures, trail maintenance, fencing, signage, enforcement, and new trails), many of the comments supported both recreation and conservation. Some comments expressed a strong desire to expand mountain biking, including areas to the west and south of Lake Calavera. Another suggestion included the "Waves to Waterfall" trail from the beach eastward along Buena Vista Creek to El Salto Falls.

4 ***Batiquitos Lagoon, Agua Hedionda Lagoon, and Buena Vista Lagoon:*** There was strong support for loop trails that create new recreational opportunities and increase access to these valuable open space areas. However, other comments identified the need to protect sensitive habitat. Many noted the safety and beauty of the lagoons as reasons why they are great places for a variety of recreational opportunities. Comments also described how improving crossings under Interstate 5 would enhance recreation at the lagoons.

5 ***Carlsbad Village:*** As one of the most popular destinations for walking and biking, Carlsbad Village received a large number of comments about different ways to enhance the safety in the area and make it more enjoyable. Prioritizing parallel streets to Carlsbad Village Drive for bicyclists, such as Grand Avenue and Oak Avenue, was suggested in multiple comments. Improvements to crossings and lighting were also recommended. Some comments suggested closing part of State Street permanently or temporarily (like the farmers market does now). Improving the crossing over the railroad tracks and under Interstate 5 on Carlsbad Village Drive was also identified as a priority.

6 ***La Costa Avenue:*** People identified the need for increased safety for bicyclists and pedestrians along La Costa Avenue. Recommendations ranged from completing the existing sidewalk system to creating new bike lanes/cycle tracks that separate bicycles and pedestrians from traffic. These comments were suggested along La Costa Avenue from Santa Fe Road west to the coast.

7 ***El Camino Real:*** There were a number of comments related to increasing safety for bicyclists and pedestrians along El Camino Real. Comments included recommendations to complete the existing sidewalk system, lower speed limits along El Camino Real, improve the safety for existing bicycle lanes, and install new bicycle lanes that separate bicyclists from cars.

8 ***Highland Drive:*** Comments regarding Highland Drive focused on upgrading the sidewalks and bike paths along this segment of road. Several comments recommended completing or upgrading the existing sidewalk system to create safer routes to school. Additional comments suggested creating more bike lanes and increasing the safety for existing lanes.

Major Themes

The major themes discussion below provide a list of reoccurring ideas or topics that were identified through the public workshop and online engagement process. Unlike the Focus Areas discussed in the previous section, the major themes can apply to multiple locations throughout the city, broad areas within the city, or general concepts that apply to the whole city.

Focus on Pedestrians- Upgrade sidewalks, intersections and street crossings:

A variety of improvements to street intersections, crossings and sidewalks were recommended. Many comments identified a specific location where improvements are needed to improve the safety and experience of walking in neighborhoods, especially to provide safe routes for children to walk to school. Comments included identification of missing segments of sidewalk, crosswalk improvements (e.g., marked crosswalks and flashing lights in high-traffic areas),and traffic calming elements (e.g., speed bumps, stop signs, traffic signals).

Improve safety and experience for bicyclists: A large number of comments identified the need to increase the number of bike facilities (paths, on-street bike lanes, etc.), as well as improve the safety of existing facilities. There were many comments regarding more separation between cars and bicycle lanes to increase safety and decrease conflicts. Several comments addressed the need to educate drivers on the proper etiquette for sharing the road with bicyclists. Additionally, increased signage and warning signs were recommended throughout Carlsbad.

Access to open spaces and balancing recreation and habitat conservation:

There were many comments that related to access to open spaces in the city and the sometimes conflicting need to protect habitat. Many comments suggested that the city needs to continue to prioritize the management of the current open spaces and some comments recommended acquisition of land for new open space areas.

Figure 3.2: Geographic Locations of Notes and Comments

Connect existing trails and develop new trails: Many comments identified a need to create more connections between existing trails and open spaces throughout the city. Some comments expressed support for accommodating a wider variety of uses in open spaces, such as biking or dog walking. There were also many comments that expressed support for expanding opportunities for mountain biking throughout the city. Other comments suggested the need to manage conflicts between different users such as joggers and bicyclists. Other recommendations included adding different types of on-street facilities and different trail types such as nature trails.

Physical and service improvement for trails: There were a variety of service improvements suggested for the existing trail system to create a safer and more convenient trail system. Comments identified the need for amenities including trash cans, pet waste receptacles, and bathroom facilities. Other comments identified the need to make trails safer through elements such as increased lighting or increasing enforcement (rangers).

Support for improvements that have already been completed: Many comments expressed approval for the existing walking and biking facilities in Carlsbad and acknowledged the city's efforts for creating a walkable and bikeable community. According to the comments, these improvements have helped to create safe and efficient walking paths throughout the city that allows residents to get around to various locations throughout the city. Other comments expressed concern about the application of sharrows.

3.6 Summarized Results of the Survey

The format and questions of the survey are shown on the following pages (see "Table 3.2: Online Survey Results". The summarized results of this survey are provided next to the survey form.

Below are key findings from the survey, with some categories combined for simplification.

Question 1 – Recreation and Exercise Activities

1. 62% of people said that they walk for fun or for exercise daily (29%) or several days a week (33%). It is also the most popular daily activity. Another 23% said they do it at least once a week.
2. Other activities that people do frequently (daily, several times a week, and weekly combined) include: hiking or going for nature walks 58%, bike riding (52%), and running or jogging (46%).

Question 2 – Walking for Transportation

1. 35.7% of people said that they regularly walk for transportation (at least weekly).
2. In total, 57.5% of people said that they do walk for transportation at least seasonally; 41.9% of people do not at all.

Question 3 – Reasons for Not Walking for Transportation

1. 69.7% of people said that it is "too far to walk where I want."
2. 25.6% of people said that they "feel unsafe based on the speed of nearby cars."
3. Feeling unsafe because of darkness (12.8%), feeling unsafe when crossing the street (10.2%), and there are no sidewalks to where I want to walk (15.8%) were also common responses.

Question 4 – Biking for Transportation

1. 33.2% of people said that they regularly bike for transportation (at least weekly).
2. In total, 51.4% of people said that they do bike for transportation (at least seasonally); 46.8% of people do not at all.

Table 3.2: Online Survey Results

1 How often do you do the following for recreation or exercise?

1 = Daily, 2 = Several days a week, 3 = Weekly, 4 = Monthly, 5 = Seasonally, 6 = Not at all

Answer	1	2	3	4	5	6	Number of Response(s)	Rating Score*
Hike or nature walk							296	3.2
Horseback riding							260	5.8
Nature observation or birding							268	4.5
Running or jogging							284	4.0
Walk for fun or for exercise							303	2.3
Mountain biking							287	4.4
Bike ride for fun or exercise							302	3.3
Skateboarding, in-line skating, roller skating, or Elliptigo®							260	5.5

*The Rating Score is the weighted average calculated by dividing the sum of all weighted ratings by the number of total responses.

2 * How often do you walk for transportation? For example, walking to get to work or school, to go shopping, or to get to the bus or the train.

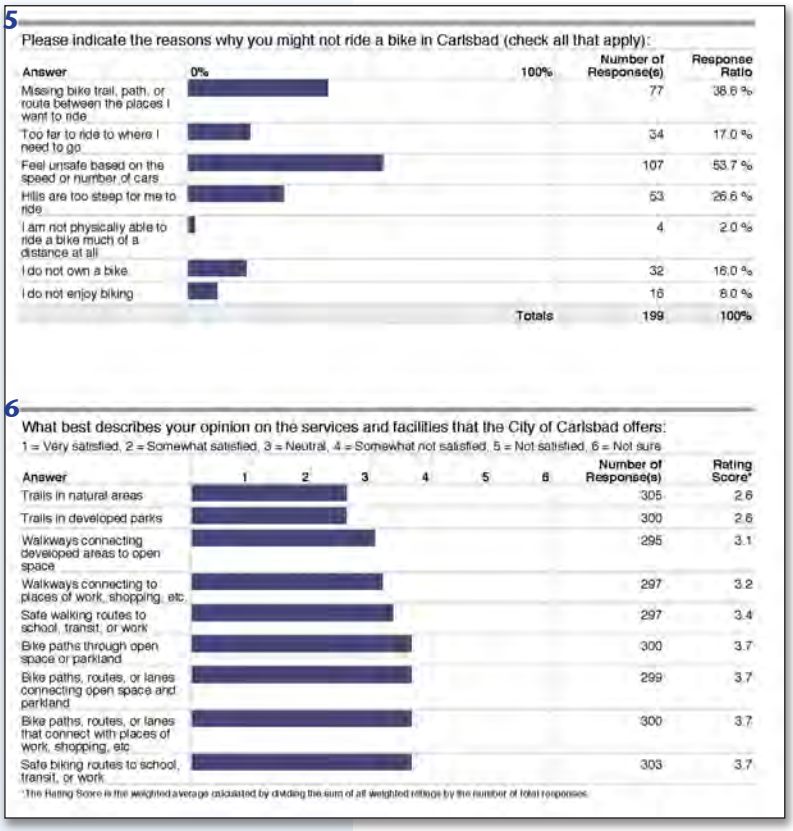
Answer	0%	100%	Number of Response(s)	Response Ratio
Daily			21	6.3 %
Several days a week			38	11.5 %
Weekly			59	17.9 %
Monthly			42	12.7 %
Seasonally			30	9.1 %
Not at All			138	41.9 %
No Response(s)			1	<1 %
		Totals	329	100%

3 Please indicate the reasons why you might not walk in Carlsbad (check all that apply):

Answer	0%	100%	Number of Response(s)	Response Ratio
Too far to walk to where I want to walk			136	69.7 %
Feel unsafe based on the speed of nearby cars			50	25.6 %
Feel unsafe when crossing the street			20	10.2 %
There are no sidewalks to where I want to walk			31	15.8 %
There are no crosswalks to where I want to walk			5	2.5 %
Feel unsafe because of darkness			25	12.8 %
Feel unsafe because of crime			7	3.6 %
Not physically able to walk much of a distance at all			2	1.0 %
I do not enjoy walking			8	4.1 %
Other			25	12.8 %
		Totals	195	100%

4 * How often do you ride a bike for transportation? For example, biking to get to work or school, to go shopping, or to get to the bus or the train.

Answer	0%	100%	Number of Response(s)	Response Ratio
Daily			23	6.9 %
Several days a week			37	11.2 %
Weekly			50	15.1 %
Monthly			30	9.1 %
Seasonally			30	9.1 %
Not at All			154	46.8 %
No Response(s)			5	1.5 %
		Totals	329	100%



5 Please indicate the reasons why you might not ride a bike in Carlsbad (check all that apply):

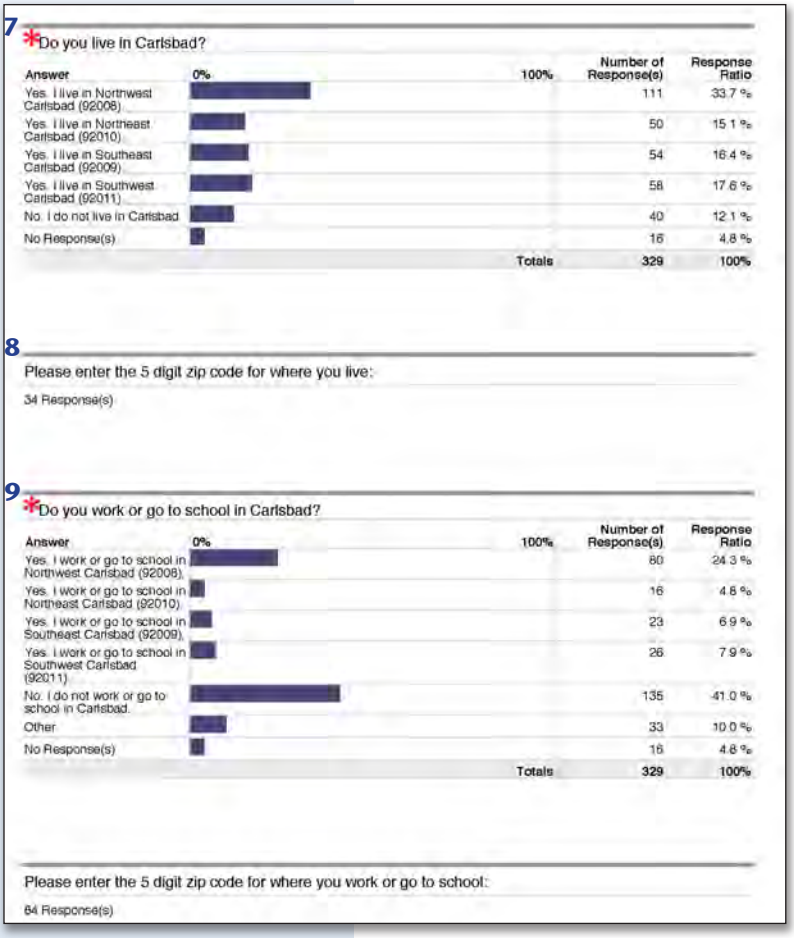
Answer	0%	100%	Number of Response(s)	Response Ratio
Missing bike trail, path, or route between the places I want to ride			77	38.6 %
Too far to ride to where I need to go			34	17.0 %
Feel unsafe based on the speed or number of cars			107	53.7 %
Hills are too steep for me to ride			53	26.6 %
I am not physically able to ride a bike much of a distance at all			4	2.0 %
I do not own a bike			32	16.0 %
I do not enjoy biking			16	8.0 %
		Totals	199	100%

6 What best describes your opinion on the services and facilities that the City of Carlsbad offers:

1 = Very satisfied, 2 = Somewhat satisfied, 3 = Neutral, 4 = Somewhat not satisfied, 5 = Not satisfied, 6 = Not sure

Answer	1	2	3	4	5	6	Number of Response(s)	Rating Score*
Trails in natural areas							305	2.6
Trails in developed parks							300	2.6
Walkways connecting developed areas to open space							295	3.1
Walkways connecting to places of work, shopping, etc							297	3.2
Safe walking routes to school, transit, or work							297	3.4
Bike paths through open space or parkland							300	3.7
Bike paths, routes, or lanes connecting open space and parkland							299	3.7
Bike paths, routes, or lanes that connect with places of work, shopping, etc							300	3.7
Safe biking routes to school, transit, or work							303	3.7

*The Rating Score is the weighted average calculated by dividing the sum of all weighted ratings by the number of total responses.



7 *Do you live in Carlsbad?

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes. I live in Northwest Carlsbad (92008)			111	33.7 %
Yes. I live in Northeast Carlsbad (92010)			50	15.1 %
Yes. I live in Southeast Carlsbad (92009)			54	16.4 %
Yes. I live in Southwest Carlsbad (92011)			58	17.6 %
No. I do not live in Carlsbad			40	12.1 %
No Response(s)			16	4.8 %
		Totals	329	100%

8 Please enter the 5 digit zip code for where you live:

34 Response(s)

9 *Do you work or go to school in Carlsbad?

Answer	0%	100%	Number of Response(s)	Response Ratio
Yes. I work or go to school in Northwest Carlsbad (92008)			80	24.3 %
Yes. I work or go to school in Northeast Carlsbad (92010)			16	4.8 %
Yes. I work or go to school in Southeast Carlsbad (92009)			23	6.9 %
Yes. I work or go to school in Southwest Carlsbad (92011)			26	7.9 %
No. I do not work or go to school in Carlsbad.			135	41.0 %
Other			33	10.0 %
No Response(s)			16	4.8 %
		Totals	329	100%

Please enter the 5 digit zip code for where you work or go to school:

64 Response(s)

Question 5 – Reasons for Not Biking for Transportation

1. 53.7% of people said that they "feel unsafe based on the speed or number of cars."
2. 38.6% of people said that they do not ride a bike for transportation because of "missing bike trail, path, or route between the places I want to ride."
3. 26.6% said that the "hills are too steep for me to ride."
4. "Too far to ride where I need to go" (17.0%) and "I do not own a bike" (16%) were also common responses.

Question 6 – Opinion on Services and Facilities Offered

1. 63% of people said they were satisfied (very or somewhat) with trails in natural areas; 17% said that they were not satisfied (very or somewhat).
2. 60% of people said they were satisfied (very or somewhat) with trails in developed parks; 12% said that they were not satisfied (very or somewhat).
3. 41% of people said there were not satisfied (very or somewhat) with safe biking routes to school, transit, or work; 23% of people said they were satisfied (very or somewhat).

Question 7 – Live in Carlsbad

1. 12.1% of respondents do not live in Carlsbad;
2. 33.7% of respondents live in Northwest Carlsbad.

Question 8 – Zip Code Where you Live
Question 9 – Work in Carlsbad

1. 41% of respondents do not work in Carlsbad;
2. 24.3% of respondents work in Northwest Carlsbad.

Question 10 – Use of Transportation Options

1. 56% regularly (5 days a week or almost every day) drive to work alone.
2. For discretionary trips (to non-work or non-school locations), 21% regularly walk and 14% regularly ride a bike (5 days a week or almost every day); 44% irregularly walk and 40% irregularly ride a bike (at least once a week or at least once a month).
3. 20% irregularly ride the coaster, Amtrak, or sprinter (at least once a week or at least once a month).
4. 9% regularly (5 days a week or almost every

day) ride a bike to work; 17% irregularly ride a bike to work (at least once a week or at least once a month).

Question 11 – Prioritizing Transportation Improvements

1. 42% of people responded that they thought it was most important that the city should add more pathways that are separated from cars. This was also the improvement with the ranking score that showed it has the most support.
2. There was also support for adding more on-street bike paths, lanes, or routes, and adding more sidewalks and crosswalks to improve walking.

Question 12 – Prioritizing Recreation Improvements (Order of Ranked Score):

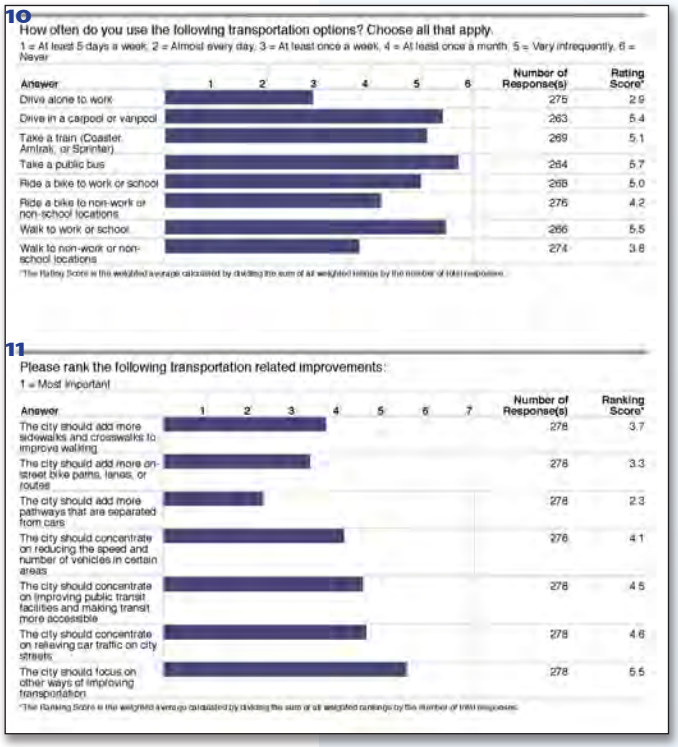
1. The city should add more trails in parks and open space areas (22.5).
2. More near-street walkways for recreational users are needed (3.1).
3. More on-street bike lanes, routes, and paths are needed (2.9).
4. More trails where I can hike or run without fear of high-speed cyclists (3.4).
5. More mountain biking options on existing and future trails are needed (3.6).
6. More equestrian trails and supporting facilities are needed (5.4)

Question 13 – Gender

1. 45.4% Male
2. 42.2% Female (remainder did not respond)

Question 14 – Age

1. 24 or less = <2%
2. 25-34 = 7.2%
3. 35-44 = 22.1%
4. 45-54 = 24.9%
5. 55-64 = 23.4%
6. 65+ = 9.7%



10
How often do you use the following transportation options? Choose all that apply.
1 = At least 5 days a week, 2 = Almost every day, 3 = At least once a week, 4 = At least once a month, 5 = Very infrequently, 6 = Never

Answer	Number of Response(s)	Rating Score*
Drive alone to work	275	2.9
Drive in a carpool or vanpool	263	5.4
Take a train (Coaster, Amtrak, or Sprinter)	269	5.1
Take a public bus	264	5.7
Ride a bike to work or school	268	5.0
Ride a bike to non-work or non-school locations	276	4.2
Walk to work or school	266	5.5
Walk to non-work or non-school locations	274	3.8

*The Rating Score is the weighted average calculated by dividing the sum of all weighted ratings by the number of total responses.

11
Please rank the following transportation related improvements:
1 = Most important

Answer	Number of Response(s)	Ranking Score*
The city should add more sidewalks and crosswalks to improve walking	278	3.7
The city should add more on-street bike paths, lanes, or routes	278	3.3
The city should add more pathways that are separated from cars	278	2.3
The city should concentrate on reducing the speed and number of vehicles in certain areas	278	4.1
The city should concentrate on improving public transit facilities and making transit more accessible	278	4.5
The city should concentrate on relieving car traffic on city streets	278	4.6
The city should focus on other ways of improving transportation	278	5.5

*The Ranking Score is the weighted average calculated by dividing the sum of all weighted rankings by the number of total responses.

12
Please rank the following recreation related trail improvements:
1 = Most important

Answer	Number of Response(s)	Ranking Score*
More equestrian trails and supporting facilities are needed	280	5.4
More mountain biking options on existing and future trails are needed	280	3.6
More trails where I can hike or run without fear of high-speed cyclists are needed	280	3.4
More near-street walkways for recreational users are needed	280	2.9
More on-street bike lanes, routes, and paths are needed	280	3.1
The city should add more trails in parks and open space areas	280	2.5

*The Ranking Score is the weighted average calculated by dividing the sum of all weighted rankings by the number of total responses.

Please provide your contact information below. We will only use this information to keep you updated about the project. This information will be kept private and will not be distributed for purposes that are not related to this project.

Answers	Number of Response(s)
First Name	231
Last Name	230
Email Address	226

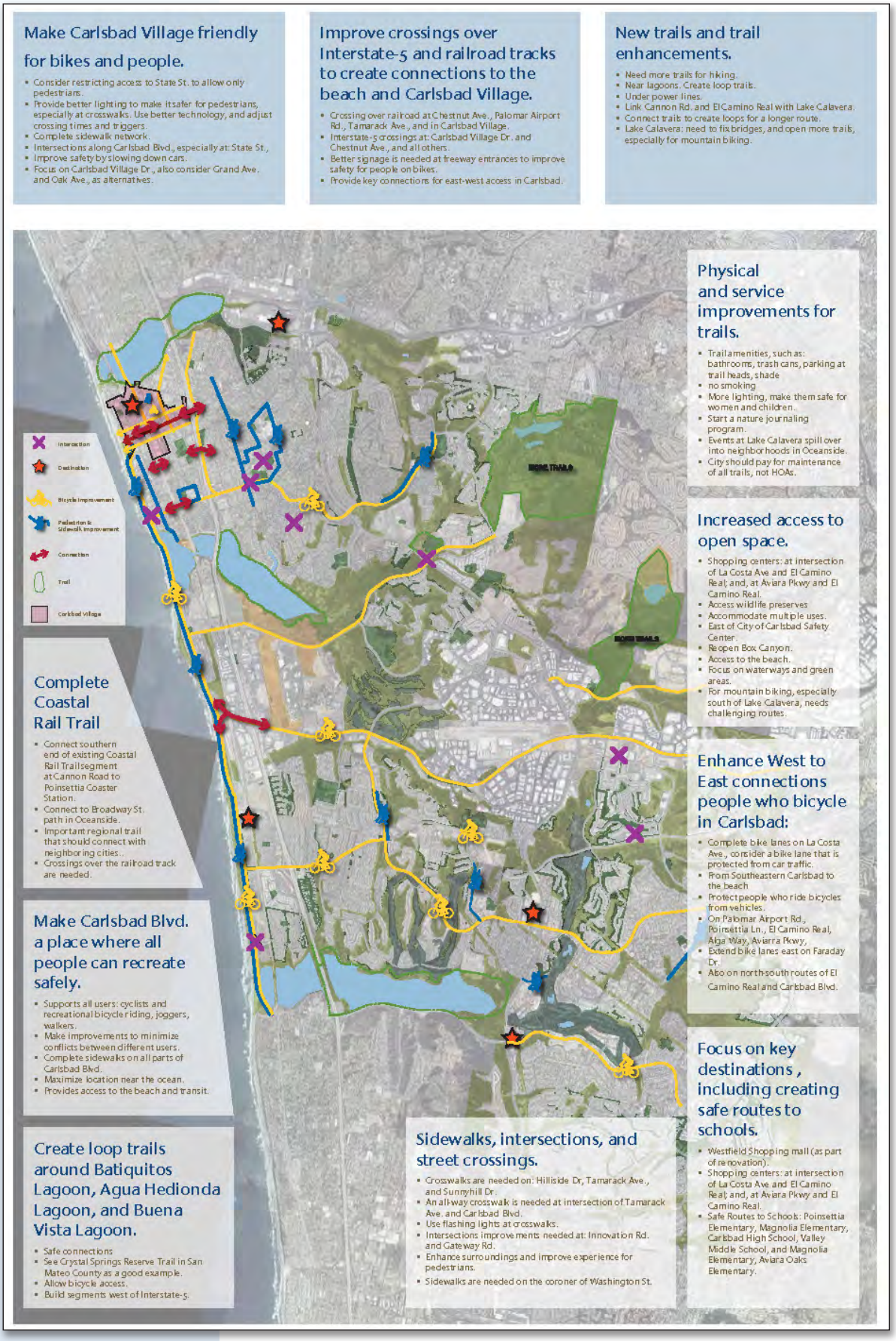
13
What is your gender?

Answer	0% 100%	Number of Response(s)	Response Ratio
Male		149	45.2 %
Female		139	42.2 %
No Response(s)		41	12.4 %
	Totals	329	100%

14
What is your age?

Answer	0% 100%	Number of Response(s)	Response Ratio
17 years or younger		1	<1 %
18 - 24		3	<1 %
25 - 34		24	7.2 %
35 - 44		73	22.1 %
45 - 54		82	24.9 %
55 - 64		77	23.4 %
65+		32	9.7 %
No Response(s)		37	11.2 %
	Totals	329	100%

Figure 3.3: Note Summary of Comments



Chapter 4

Trail Typology

4 Trail Typology

This chapter summarizes the recommended trail classification system for the City of Carlsbad. Typology typically refers to the type of use of the trail and the associate type of trail surface material. Trail design guidelines found in subsequent chapters are organized around the trail types. The trail types are also let trail users know what they should expect in terms of width, trail surface, steepness, firmness of the surface and amenities that will all affect the trail users experience.

4.1 Trail Types

Carlsbad's trail types were developed specifically to address local conditions. An overview of the proposed trail types can be found on "Table 4.1: Summary of Trail Types and Application of General Standards". The development of the trail design criteria was intended to enhance public welfare, improve safety, minimize maintenance and avoid environmental impacts. The standards define maximum width, the range of surface types and overall grades for open space trails (Types 1, 2 and 3) and for transportation based trails (Types 4, 5 & 6). The widths are developed to accommodate a range of users, with wider trails required for areas with multiple user types and high volumes of users.

Carlsbad trails range from very natural and challenging such as this Type 1: Nature Trail shown above, to very urban and improved as shown below with this Type 6: Multi-use Path

Table 4.1: Summary of Trail Types and Application of General Standards

TRAIL OR ROUTE TYPE #	General Descriptions			Width			Slope			Trail Users Supported								
	Trail Type	General Activities Supported	Location (Open Space or Roadway)	Minimum Width	Ideal for Trail User Experience	Maximum Width	Maximum Slope*	Ideal Slope	Maximum Cross-slope	Roadbike (high press. thin tired)	Hybrid/Cruiser/Recreation Bike	Mountain / BMX Bike	Wheelchair*	Stroller / Kids Push Bikes	Social / Exercise / Dog Walker	Jogger / Runner	Hiker / Nature Walker	Equestrian
RECREATION TRAIL TYPES (SOFT OR FIRM SURFACE TRAILS IN OPEN SPACE)																		
1	***Nature Trail***	Nature Appreciation, Birding, Adventure, Fresh Air, Low Impact Exercise	Open Space and Natural Areas	2'	4'	4'	25.0%	8.3%	5.0%			✔			✔	✔	✔	
2	***Recreational Trail***	Nature, Adventure, Exercise, Dog Walking and Social Interaction	Open Space and Parks	4'	6'	8'	14.0%	5.0%	5.0%		✔	✔	?*	✔	✔	✔	✔	✔
3	***Wide Dirt Trail or Utility Roadbed***	Nature, Exercise, Dog Walking and Utility Access	Open Space and Natural Areas, Typically on Utility Access Roads	8'	10'	14'	20.0%	8.3%	5.0%		?**	✔		?**	✔	✔	✔	✔
ACTIVE TRANSPORTATION / REC. TRAILS (FIRM OR HARD SURFACE MOSTLY NEAR ROADS)																		
4	***Roadside or Connector Trails***	Park Circulation, Exercise, Transportation Connector, Social Interaction	Separated from Roadways taking the place of Concrete Sidewalks	5'	8'	12'	Follows road slope	5.0%	2.0%		✔	✔	?*	✔	✔	✔	✔	
5	***Connector Sidewalks or Special Street Crossings***	Exercise and Transportation Connecting Trailheads and Parks	Attached to Roadways as Sidewalks or Across Intersections	4'	6'	8'	Follows road slope	5.0%	5.0%				?*	✔	✔	✔	✔	
6	***Paved Multi-use Trail (Class 1: all Non-motorized Users)***	Exercise, Multiple Mixed Modes, Social Interaction and Transportation	Near Roadways taking the place of Concrete Sidewalks or Through Parks and Open Space	8'	14'	16'	8.3%	5.0%	2.0%	✔	✔	✔	✔	✔	✔	✔	✔	

* Wherever feasible, new trail construction will comply with the ADA Outdoor Accessibility Guidelines per AASHTO ** Compatibility with user type will depend on skill level and tire type

Type 1: Nature Trail

Typically these are located in natural open space, are two to four feet wide and surfaced with local naturally occurring materials, usually a mix of soil and fine to coarsely broken rock (see "Figure 4.1 "Type 1" Nature Trail Diagram and Sample Images"). In order to limit impacts of Type 1 trails, the widths and horizontal and vertical changes can be more abrupt. By providing flexibility in layout, sensitive or protected habitat can be avoided or impacted to the least degree possible and the relationship of the trail to nature can be better integrated. However, this flexibility also results in less access to those with limited physical endurance and would not likely be considered ADA accessible due to vertical slope and trail surfaces. Federal and State ADA guidelines only allow for a trail route to exceed minimum standards if compliance would be too damaging to cultural, historic or natural resources. Note that many of the design factors applicable to Type 1 trails are also applicable to Type 2 trails.

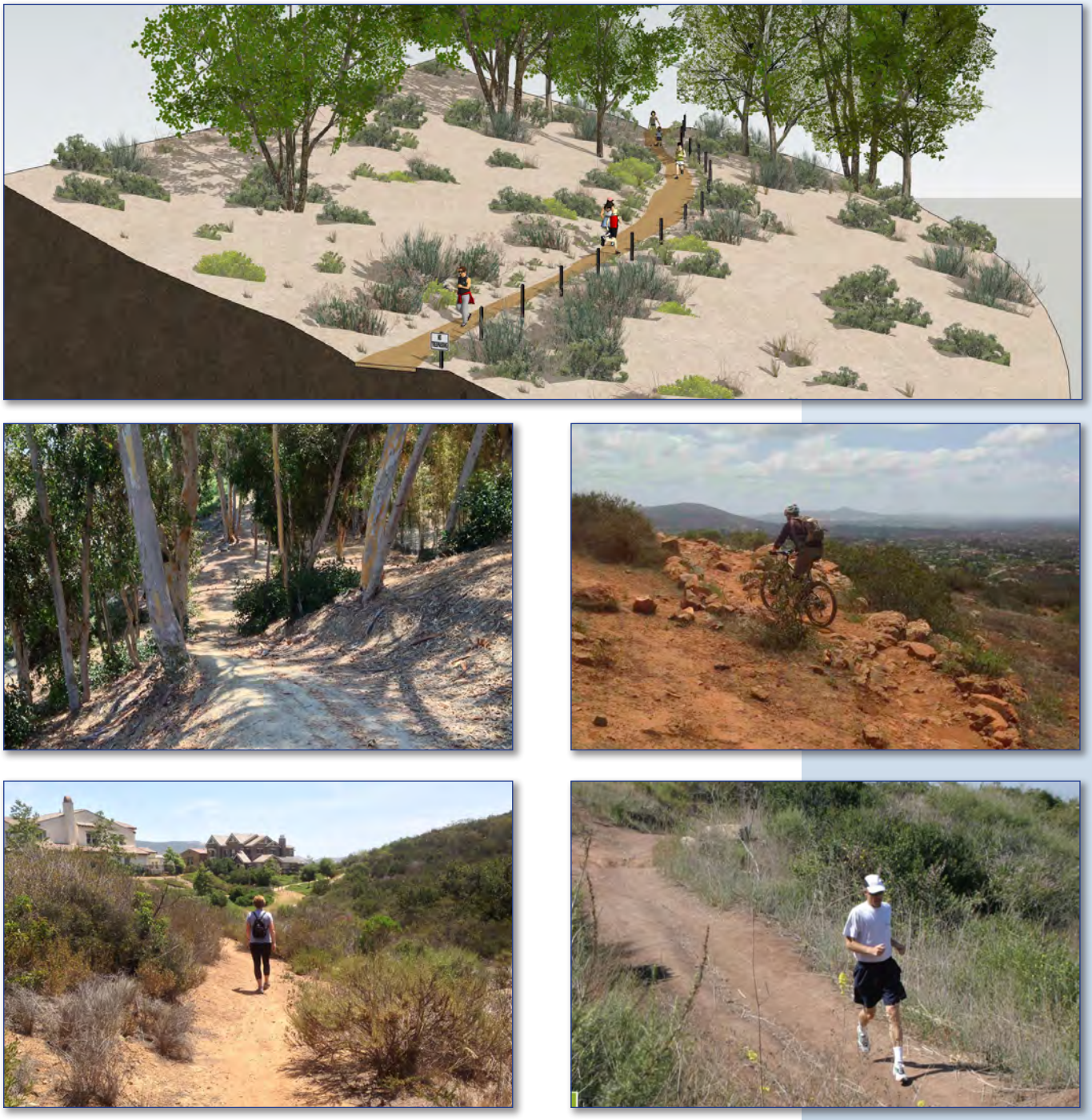


Figure 4.1 "Type 1" Nature Trail Diagram and Sample Images

Type 2: Recreation Trail

This trail type is similar to Type 1 trails, but are four to eight feet wide (see "Figure 4.2: "Type 2" Recreation Trail Diagram and Sample Images"). A Type 2 trail is often, though not always, constructed to the width, vertical slope and surface treatment standards to meet accessibility requirements. These multi-use trails accommodate a broader range of trail users.

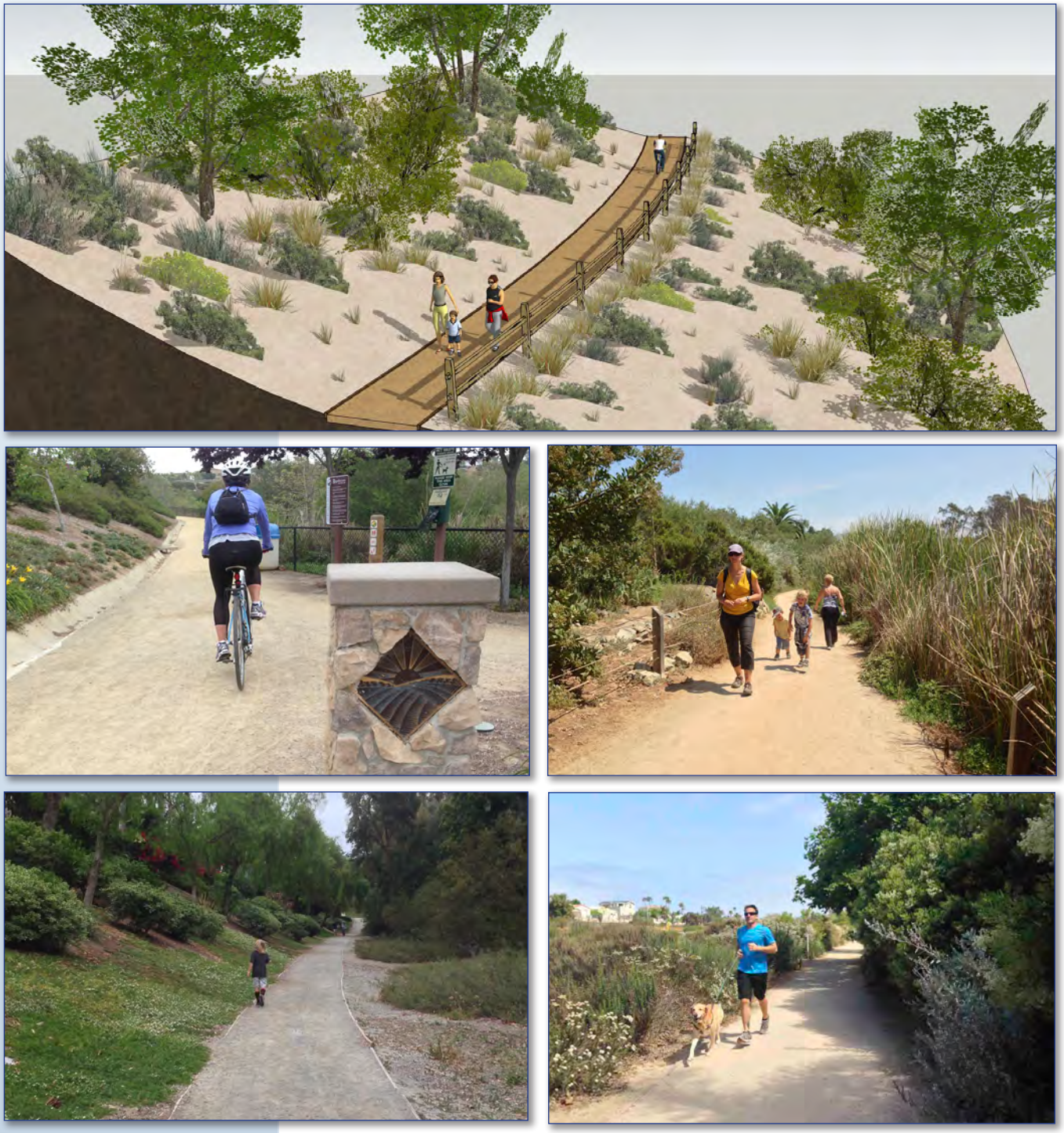


Figure 4.2: "Type 2" Recreation Trail Diagram and Sample Images

Type 3: Wide Dirt Trails or Utility Roadbeds

These trails are generally unpaved roads, usually with a surface of imported or locally sourced crushed rock (see "Figure 4.3: "Type 3" Wide Dirt Trails or Utility Roadbed Diagram and Sample Images"). These utility easements or maintenance access roads are often used as trails. They vary greatly in width from 8 feet to 14 feet. Sometimes these roads also serve as a firebreak when located in native canopy hillsides, valleys or canyons. They are often steep with wide radius turns. They do not meet ADA standard due to steepness or surface treatments. They are not likely to include amenities since they are joint use access roads, subservient to the primary utility access function and requirements. The loose nature of gravel surfaces makes these trail types less desirable for strollers or medium to thin tired bikes.

Figure 4.3: "Type 3" Wide Dirt Trails or Utility Roadbed Diagram and Sample Images

Type 4: Roadside or Connector Trails

To be called a Type 4 Roadside or Connector Trail (see "Figure 4.4: "Type 4" Roadside or Connector Trail Sample Images"), it must provide a trail like experience, even if it is along a roadway. A regular sidewalk against the edge of the road is not a trail experience and would be a Type 5 Connector Sidewalk. A Type 4 trail is typically stabilized decomposed granite with a width between 5 feet and 10 feet and separated from the vehicle traffic by at least a 5' buffer. Connectivity to open space is desirable and assumed for this definition. In some cases they may be concrete or asphalt walkways.

Figure 4.4: "Type 4" Roadside or Connector Trail Sample Images

Type 5: Connector Sidewalks or Special Street Crossings

A roadway edge sidewalk that is paved with little or no buffer is considered to be a Type 5 Connector Sidewalk (see "Figure 4.5: "Type 5" Connector Sidewalks or Special Street Crossings Sample Images"). This category also includes mid-block crossings (signalized or non-signalized) and regular intersection crosswalks if they are used to access trails.

Based on the definition in this plan, a connector sidewalk needs to connect an existing open space trail (Type 1, 2, or 3) or another circulation based trail (Type 4 or 6). Most of the sidewalks that fall under this category already exist and are being included to show how the other trail types can be connected via the sidewalk system.

Figure 4.5: "Type 5" Connector Sidewalks or Special Street Crossings Sample Images

Type 6: Paved Multi-use Trails (Class I)

These trails are always firm surface trails or paths paved with asphalt, and occasionally concrete (see "Figure 4.6: "Type 6" Paved Multi-use Trail Diagram and Sample Images"). Type 6 trails are off the roadway and range from 8 feet to 16 feet wide; essentially broad trails with exclusive right-of-way for bicycles, pedestrians and other non-motorized users. These trails are often found in parks, along river and beachfronts, and in greenbelts or utility corridors where right-of-way exists and virtually no motorized vehicles to be concerned with. This condition allows for fewer trail user conflicts and higher trail use where there may be desirable features or activities that warrant higher volumes of trail use. These types of trails are the most desirable trail types expressed by citizens for areas where there is a strong desire for recreational and transportation alternatives, such as the Coastal Rail Trail overlooking or along the lagoons, the beaches, the flower fields or other destinations to major activities.
The ***AASHTO Guide's*** "shared-use path" is synonymous with a Type 6 trail. A **Caltrans Class 1 Multi-use Path** is also synonymous with a Type 6 trail.

Figure 4.6: "Type 6" Paved Multi-use Trail Diagram and Sample Images

4.2 Carlsbad's Existing Trail System

Most of the trails developed in Carlsbad that are in open space areas of the city fall into the Type 2 category of multi-use recreational trails. They have been constructed using highly compacted decomposed granite surfaces and are typically 8-10' wide. There are also a large number of Roadside and Connector Trails (Type 4) and Connector Sidewalks (Type 5) composed of concrete, asphalt or compacted and stabilized decomposed granite. These trails were built as part of adjacent developments to design standards that have been in place for many years and align with many of the design guidelines outlined in the 1992 OSCRMP.

Type 1 trails tend to be in areas of steeper terrain and, in many instances, were not related to developments or constructed to any standard. Many of these trails were simply created as a foot worn path, old agricultural road, or mountain biking trails, with minor trail construction efforts or surface improvements. The experience on these trails is a bit more interesting and closer to the natural resources of the trailside setting. These nature trails tend to have more varied grades, high variability in widths, and often have tighter curves and less fencing or railing.

The distribution of trails tend to follow the steeper areas of Carlsbad where development is more difficult, or near canyons, riparian zones or around the lagoons. The newer developed areas of the city tend to have a greater extent of trails, with the older gridded portion of Carlsbad Village having very few open space areas or trail systems. Certain areas, such as the northeast corner of the Lake Calavera Preserve or the southwest corner of the Rancho La Costa Preserve, have a high concentration of Type 1 and Type 2 trails with a complex criss-cross pattern of trails, indicating a heavy use by mountain bike riders.

4.3 Trail Amenities

Most of the existing trails in the city include trailheads with kiosks, signs, trash receptacles, pet stations, entry signs and regulatory signs. Only a few have benches, viewing points or overhead shade structures. Some of the more developed trails include off-street parking lots or parklets adjacent to trailheads that are part of a private HOA. Some of the trailheads rely on adjacent street parking, and most of the major streets that have roadside trails have on-street parking restrictions making access to some of these trails (by those living outside of the adjacent community) an inconvenience. Most of the open space trail systems do not have public drinking fountains or restroom facilities such as the Lake Calavera Preserve and the Rancho La Costa Preserve. Some have port-a-pottys such as Hosp Grove.

Chapter 5

Analysis of Existing Conditions

5 Analysis of Existing Conditions

The existing context and conditions of Carlsbad need to be considered and analyzed to assist in making decisions on where future trails and CATS related infrastructure can provide for a fully integrated trail system.

5.1 Land Uses

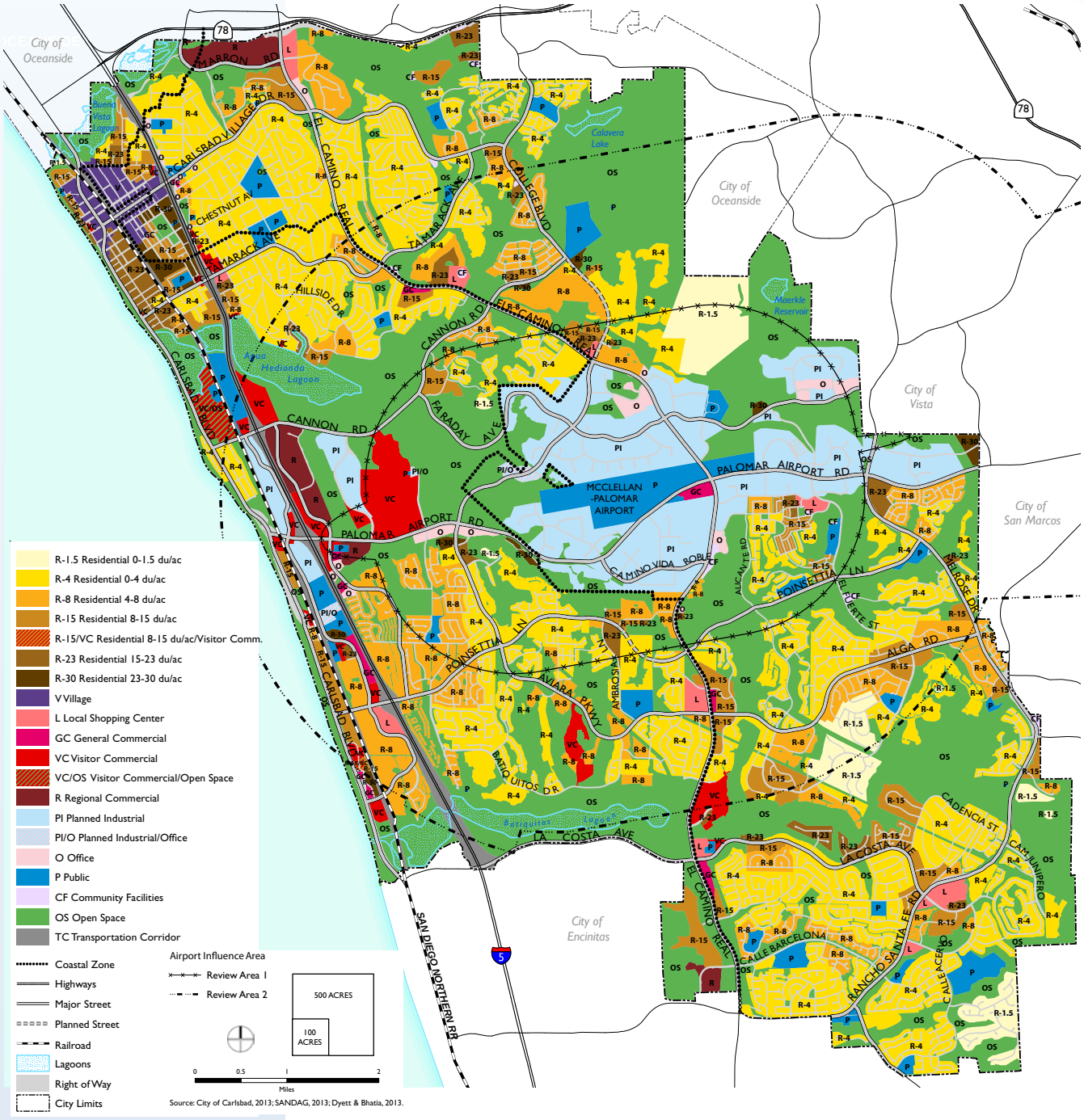
Existing land uses often set the pattern of mobility around a city as well as the preferred methods for mobility. A well integrated community that has a mix of housing, retail, schools and businesses will generally have lower overall number of daily vehicular trips and vehicle miles traveled. Mixed use communities have a higher number of non-vehicular trips taken by walking and bike. For areas where a large number of parcels are all the same type of land use, some daily activities require driving to destinations that may be a great distance away. Carlsbad has both of these conditions. The Carlsbad Village area contains a good mixture of land uses within close proximity of each other. However, many of the other development patterns in Carlsbad are single land uses covering large areas, segregated from locations of employment and retail. The existing land uses are shown in "Figure 5.1: Existing and Future Land Uses".

Future development opportunities are scattered throughout Carlsbad, with a concentration of newer development in the north associated with Bressi Ranch, Robertson Ranch, Quarry Creek and Sunny Creek. The future land use map (see "Figure 5.1: Existing and Future Land Uses") shows the locations of potential roadway extensions needed to support the proposed land uses. Note that the extension of Cannon Road to the east boundary of the city is no longer being supported.

5.2 Existing Pedestrian Systems

There is a link between the existing pedestrian system and the trail system. Much of the trail connectivity for walking, hiking or biking, also incorporates many miles of city sidewalks or roadside trails. The CATS program will be making further recommendations on how to expand the existing roadside based pedestrian system. This Trails Master Plan will identify the roadside assets that should be more clearly defined for trail purposes and how open space trails may provide for needed bike or pedestrian linkages that would benefit transportation needs.

Figure 5.1: Existing and Future Land Uses



5.3 Existing and Proposed Bike System

The CATS project is focusing on where improvements to the circulation system could be made to improve active transportation in Carlsbad, with a primary focus on bike and pedestrian facilities. The distances between land uses in most areas of Carlsbad (except for the Carlsbad Village area) are too great to have a major shift to pedestrian modes for primary circulation trips to work or for retail access because it takes longer than 15 minutes to walk. However, the distances for bike travel are not that great to overcome. In addition, the Type 4, 5 and Type 6 trails, especially as proposed in this Trails Master Plan, have the potential to function as circulation routes as well. Parts of the proposed trail system may in fact offer short cuts through open space that will connect circulation trips better between origins and destinations. The existing and proposed bike facility system is shown on "Figure 5.2: Existing and Future Bike Facilities".

5.4 Existing Park and Open Space System

Under this plan, trail connections are focused on parks, open space and the beaches of Carlsbad. The Carlsbad park system includes a wide range of community and neighborhood parks, well distributed throughout the developed areas of the city (see "Figure 5.3: Existing Park and Open Space System") . These parks include varying levels of active and passive facilities. A fairly significant number of the smaller parks are Home Owner Association (HOA) based parks reserved for the local residents of the development and fully maintained by the HOA. Many of these smaller parks are near trail heads of the existing trail system (see "Figure 5.4: Major Trailheads, Origins and Destinations of Recreational Interest").

Open space is equally well distributed throughout the city, with hills to the east, canyons leading to the beaches on the west, and lagoons reaching a significant distance inland. These open spaces were preserved for a variety of reasons, including habitat preserves and open space access through trails. Access to open space and trails continues to be a high priority to Carlsbad residents as demonstrated in annual citizen surveys, so this feature of the city and this land use is an important lifestyle issue for residents (see "Figure 5.3: Existing Park and Open Space System"). The major trailheads and other recreation based destinations are shown on (see "Figure 5.4: Major Trailheads, Origins and Destinations of Recreational Interest").

5.5 Origins and Destinations

Future development of the trails in Carlsbad examines the origins, destinations and the desired connections between neighborhoods, beaches, lagoons, schools, parks and other activity centers. Origins are generally defined for trails and pedestrian analysis as where people live and lodge (campgrounds and hotels). Destinations are places where people visit, such as work, school, shopping, parks restaurants, and in particular to Carlsbad's major activity centers, such as major shopping outlets, lagoons, nature preserves, Legoland, Flower Fields, Palomar Airport, and seven miles of beaches. Connections are the roadways, bike facilities, sidewalks and trails that get people from the origin to the destination and vice versa.

5.6 Existing Public Property Ownership

Closely related to public open space, publicly owned lands are generally available for public access, unless the access would be dangerous to the users, would interrupt operations, or would cause major impacts to sensitive areas, habitats, or resources.

5.7 Existing Private Property Ownership

Although a significant portion of Carlsbad is maintained as public parkland and open space systems, the remaining portion is privately owned and either currently developed or likely to be developed in the future. Normally, most privately held land would be considered inaccessible or unobtainable when considering a trail system. However, for larger parcels with development proposal, adopting preliminary trail alignments is common and allowed under the Subdivision Map Act of California. If a trail has been identified in an adopted plan, then the local municipality can require the dedication of an easement and the construction of the project as part of the approval process. For the purposes of this plan, all properties where a trail easement has been negotiated or has been discussed represents an opportunity for a future trail. For smaller parcels already developed, the alignment of a trail system would be challenging and should normally be avoided. In some of these cases, an access easement, utility easement or developed or undeveloped right-of-way may be possible.

5.8 Existing Vegetation Communities

One of the typical goals of a trail is to provide access to rich and diverse natural open spaces, including lagoons, bluffs, hillsides and riparian corridors. However, having the trail too close to these areas can also create some unacceptable levels of disturbance. The methodology table classifies certain types of vegetation communities and habitats that are typically more sensitive to adjacent uses than others. During the design, engineering and environmental phase, trails can be adjusted to avoid or lessen environmental impacts. Locating a trail through sensitive protected habitat areas should be avoided. For the purposes of this document, the general vegetation cover for Carlsbad, has been used to identify areas with likely high challenges for new trail development or areas of opportunities based on levels of disturbance and the extent of non-native vegetation patterns.

5.9 Existing Topography

Existing topography plays a major role in siting trails that will be sustainable. On-road facilities typically should be held at maximum slopes of under 10% and walkways under 8%. However, trails, by their very nature, often strive to access hilltops and across slopes. So although a slope may be steep, the trail design determines the actual longitudinal slope, not the "fall line" slope. It should be noted that the ability to make a trail ADA accessible becomes much more challenging on steeper slopes and the overall grading, retaining wall and drainage improvements are more expensive the steeper the slope. The ability to create a cross slope trail that is cut into a steep slope becomes prohibitively expensive if the slopes are greater than 45%. But slopes under 20% are not that difficult to make relatively gentle with moderate costs. The areas of potential future trails that go through steep topographic areas have been mapped and considered to be constraints to trail development. Areas that are flat are considered to be opportunities for new trail development based on ease of construction, but these areas may or may not offer the trail experiences and vistas that many come to expect on trails networks.

5.10 Existing Preserve System

The existing Habitat Management Plan for the City of Carlsbad includes guidelines for the development of trails in sensitive habitat areas. These considerations and guidelines will be vital for the future development of any future trails in these areas. It should be noted however, that most of the open space trail system where there is sensitive habitat have already been developed. The trail types most desirable to develop here will be Type 1 and possibly Type 2 or Type 6 trails around the Agua Hedionda Lagoon areas near the coastal corridor. Environmental review for the trails in these areas will be part of the CATS program or future planning associated with the I-5 widening projects. Please refer to "Figure 5.5: Habitat Management Plans and the Preserve System".

5.11 Challenges to Trail Development

The results of the gap analysis and community input provided information on where gaps need to be filled to create a more complete and connected trail system. Another level of analysis is useful to determine the types of challenges that may be present if new trail construction is proposed in different areas of the city. A ranking methodology was developed to allow the GIS data layers to identify where a higher level of challenge is expected for new trail development (see"Table 5.1: Methodology to Rank Challenges to Trail Development"). Some of these factors should be considered as fatal flaws and the trail should not be considered at all, while others, because of the importance of the connection or the quality of the area to be accessed, are not necessarily fatal flaws and further review and analysis should be conducted to see if the impacts can be limited and the issues addressed. The table shows the level of challenge or opportunity the site condition may represent. The individual cells try to provide a level of metric used to determine which category different site features fit within.

5.12 Gap Analysis

Gap analysis is a term used to describe existing, missing links or "gaps" in the trails system that should be high priorities for "closing" in the future. A gap could simply be an unimproved or under-improved portion of a trail between an origin and a destination. A gap could also be a trail that just "dead-ends" even though it may be adjacent to open space that could provide a trail connection. Finally, a gap can also be the lack of sidewalks or roadside trails and on-road bike facilities that get people from where they live (origins) and where they want to go. A GIS-based gap analysis was completed for the trails system using a process of overlaid maps with various walk time elements that help to highlight gaps (see "Table 5.2: Gap Analysis Methodology"). A walktime analysis is a method in which the GIS software looks at an origin point and a destination point, and determines, based upon a 2.5 mile per hour speed of a pedestrian, how far one can get in a predetermined length of time. In the case of this study, a 15 minute walk is considered to be reasonable for persons that may wish to walk to parks, open space and trails, shopping centers, schools, the beaches and other major destinations.

The main purpose for providing trails in Carlsbad is to provide for active lifestyle opportunities that can enhance health and quality of life for both citizens and visitors. The benefits for outdoor exercise that trails can provide are a desirable feature of Carlsbad's recreational opportunity that provides citizens an affordable way to mental and physical health. Based on personal fitness guidelines, the minimum walking or exercise time for adults is 30 minutes a day. Having a 10 minute walk out, a 10 minute walk around a recreation space, and a 10 minute walk back meets these guidelines. When an origin is not connected in a 10 minute period with a destination, then a gap is considered to occur. This gap could be closed by providing other on-street improvements (bike lanes or sidewalks) to allow different and perhaps shorter connections, or through the addition of a trail through an open space that may also reach a destination on the other side of an open space.

Table 5.1: Methodology to Rank Challenges to Trail Development

Non-road Based Trails (Type 1, 2, 3 and 6)

	Importance	High Challenge	Moderate Challenge	Minor Challenge	Minor Opportunity	Moderate Opportunity	High Opportunity
		Highly constrained with significant implementation challenges	Constrained with challenges for implementation	Slightly constrained but still implementable	Slight opportunity that helps implementation	Moderate opportunity for trail alignment & implementation	Great opportunity for trail alignment & ease of implementation
Raw Score:	**0.5 to 1.5**	**-1.5**	**-1**	**-0.5**	**0.5**	**1**	**1.5**
PROJECT OPPORTUNITY FACTORS							
1. Public Ownership of Lands	**1.50**				Publically owned lands by quasi-public agencies where primary use is not focused on public access	Publically owned undeveloped lands, easements and semi-developed ROW	Publically owned dedicated open space, parkland or undeveloped ROW
2. Private Property	**1.50**	Private residential property (<5 acres)	Private residential property (>5 acres)	Private commercial property	Subdivision or discretionary approval pending; trails have not been previously identified in OSCRMP or other plans	Pre-application review or application submitted where a trail has been identified in OSCRMP	Property identified as part of the I-5 PWP, or a granted easement exists (that has not been constructed)
3. General vegetation cover (within 12.5' of trail centerline)	**1.00**	Wetland, vernal pools, emergent wetlands, marshland, riparian scrub, open water, creekbed, & willow woodland	Riparian woodland, chaparral, oak woodland, coastal sage, maritime scrub & native grasslands	Non-native grasslands or natural areas that are disturbed	Next to agricultural areas, groves or agriculture being converted to trail use	Non-native and non-sensitive vegetation areas	Newly graded or cleared area or highly disturbed open areas
4. Topography	**0.50**	Excessively steep >45%	Steep slopes 20-45%	Moderately steep slopes 10-20%	Flat 0-3%	Gentle slopes 3-5%	Moderate slopes 5%-8.3
5. Preserve Status / Habitat	**1.50**	**Level 1:** Open space for preservation of sensitive wildlife species *(no trails allowed due to habitat destruction from new trails or fringe affects)*	**Level 2:** Open space for preservation of sensitive plant species, natural resources & general habitats *(trails only allowed on existing trailbeds, roadbeds or other disturbed non-habitat areas; signage & mitigation required)*	**Level 3:** Open space for general biodiversity with no sensitive plants or wildlife species *(trails allowed through non-sensitive habitat areas)*	**Level 4**: Natural open space, non-sensitive wildlife or disturbed vegetation not intended to be used for mitigation *(trails encouraged)*	**Level 5:** Open space for unprogrammed recreation (trails encouraged)	**Level 6:** Open space for aesthetic, cultural, active transportation development and educational purposes *(trails required)*

The goal of any active transportation plan is to have people drive less and use other modes of transportation, to combine trips or to shorten trips. One important way the trails master plan can help in these general circulation goals is to create recreation and outdoor healthy activity that can start at the "front door" instead of the "car door". In other words, a walk to the park or a trail should be encouraged to start at a person's front door. This not only cuts down on trips, but it also reduces the impact on neighborhood parking of trailhead parking areas. An overall goal of the fully built out trails system is to have all residential and commercial units in Carlsbad located within a 10 minute walk of a trailhead, a park or near an open space, beach or other recreational destination.

5.13 Existing Walktimes from Trail Heads

As shown on "Figure 5.6: Ten Minute Walktime Zones from Trailheads", most of Carlsbad's housing is within a 10 minute walk of some type of park, beach, open space, trail or trailhead. This map can be used to determine if tourist oriented origins (hotels and lodges) are within a 10 minute walk of open space or other tourist oriented destinations.

Table 5.2: Gap Analysis Methodology

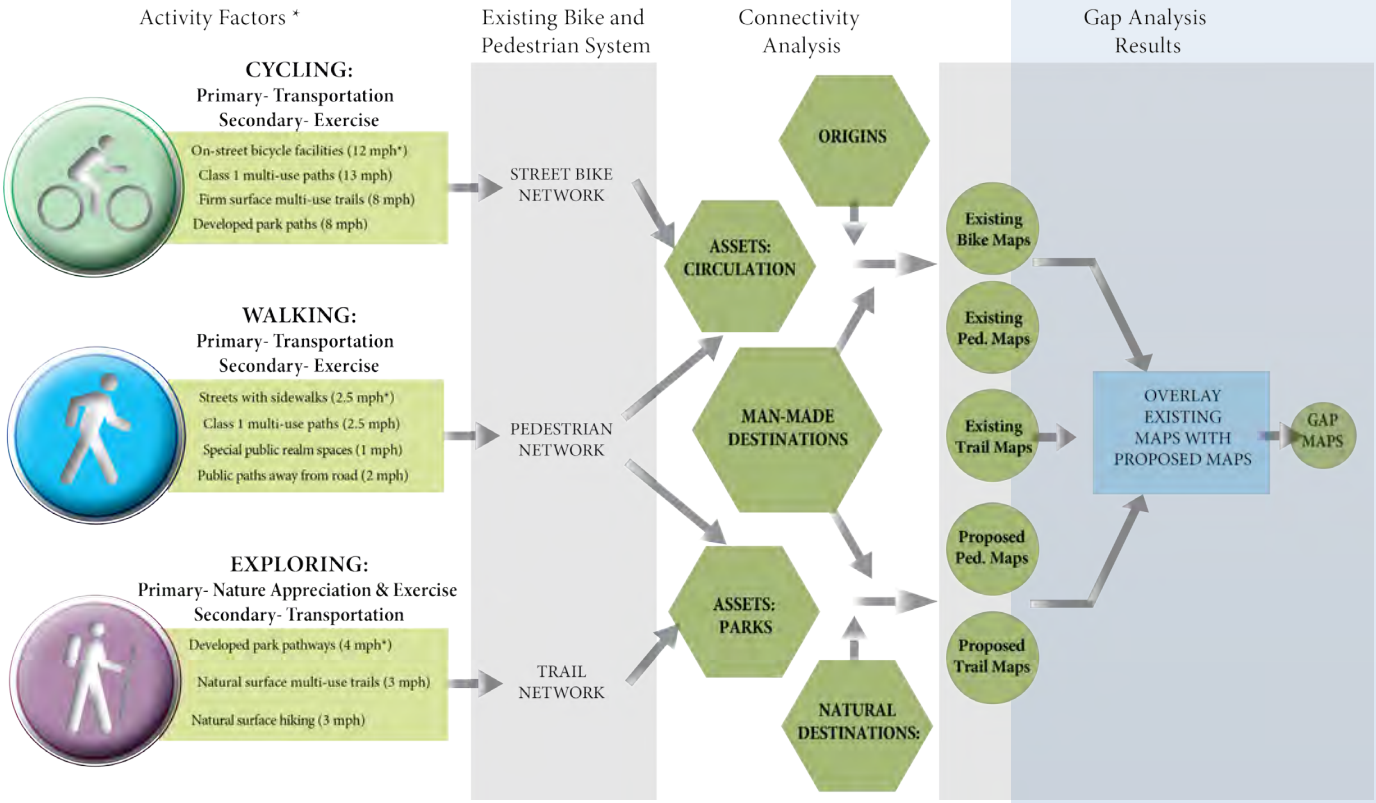


Figure 5.2: Existing and Future Bike System

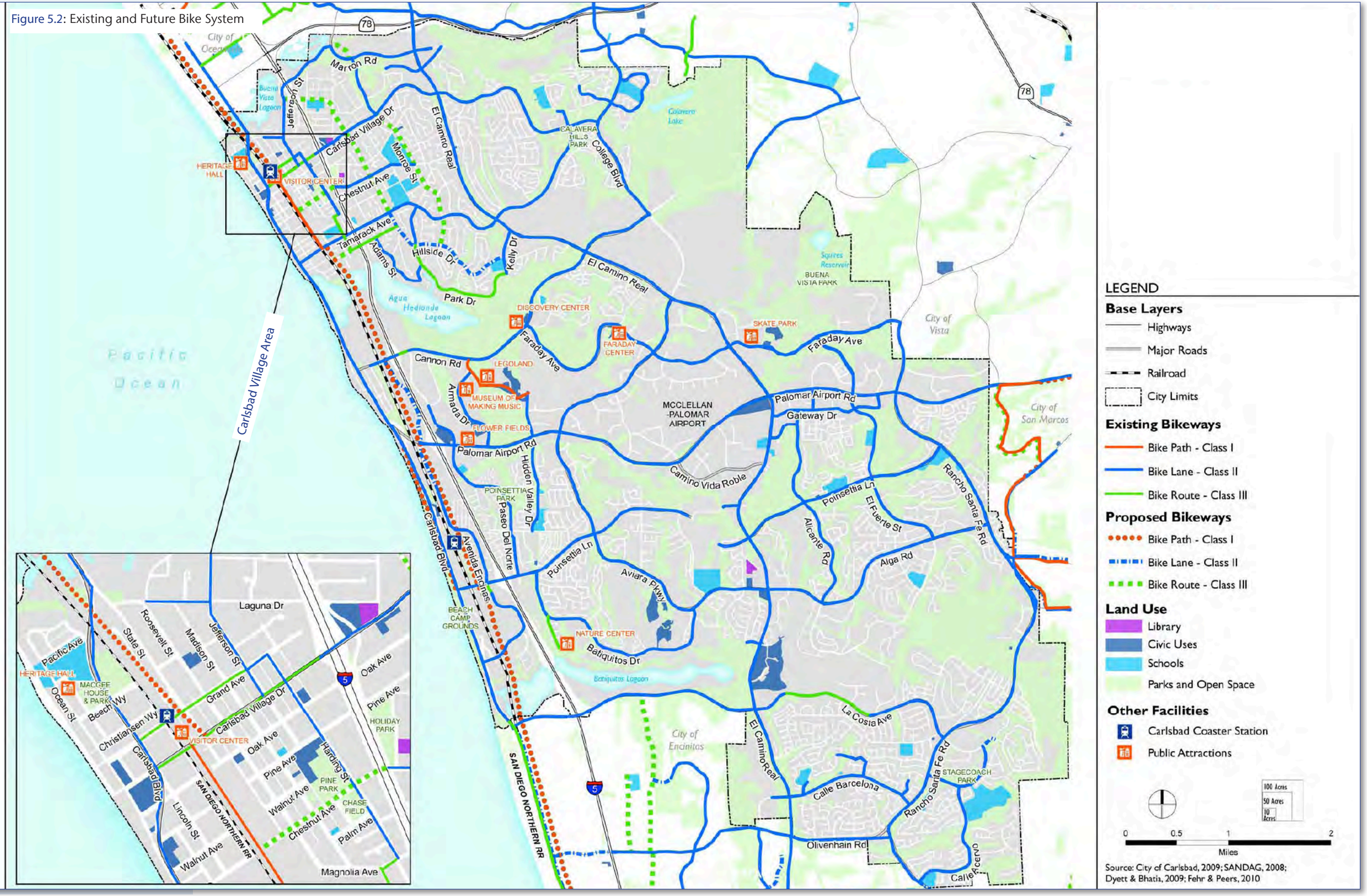


Figure 5.3: Existing Park and Open Space System

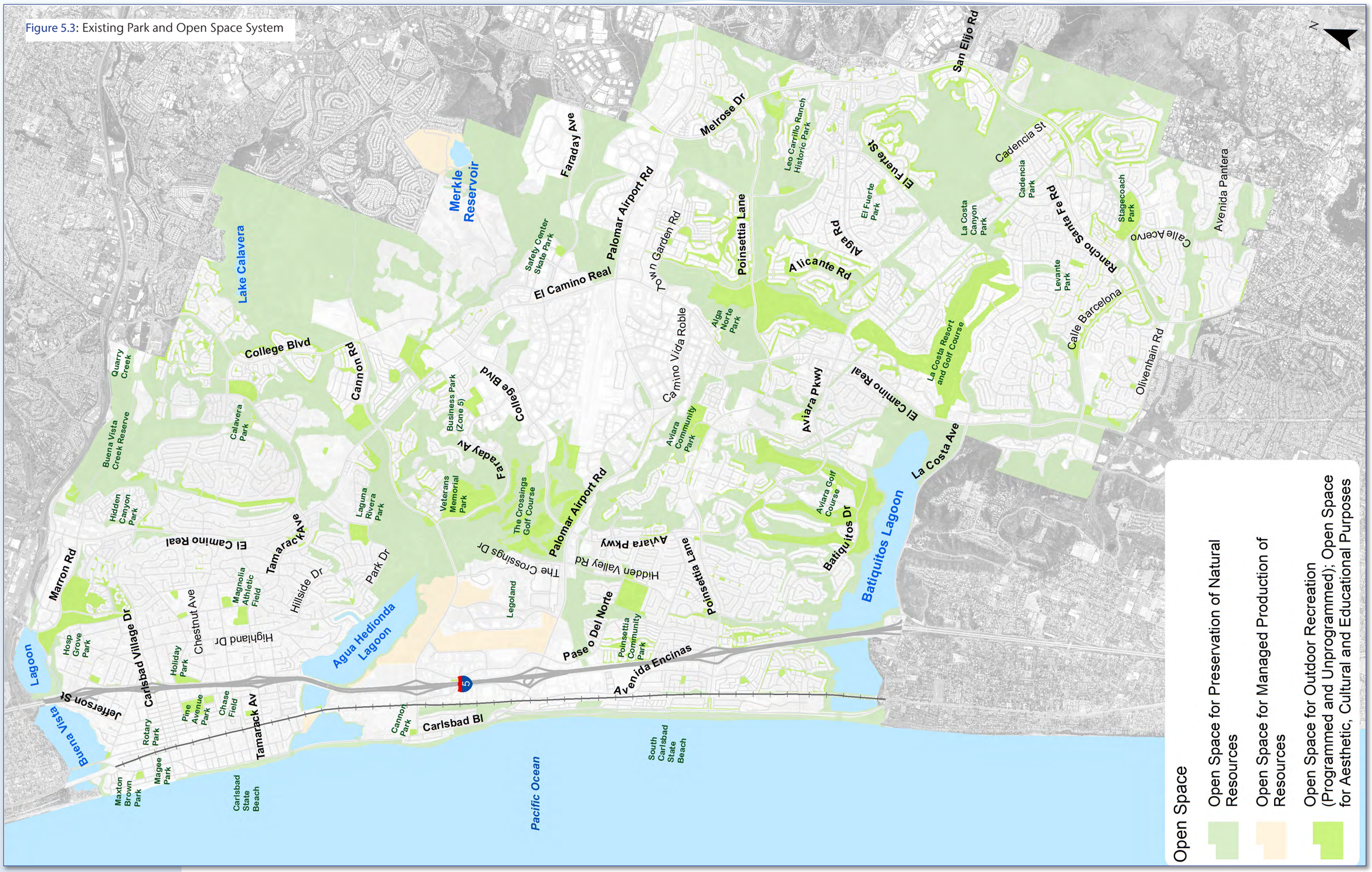


Figure 5.4: Major Trailheads, Origins and Destinations of Recreational Interest

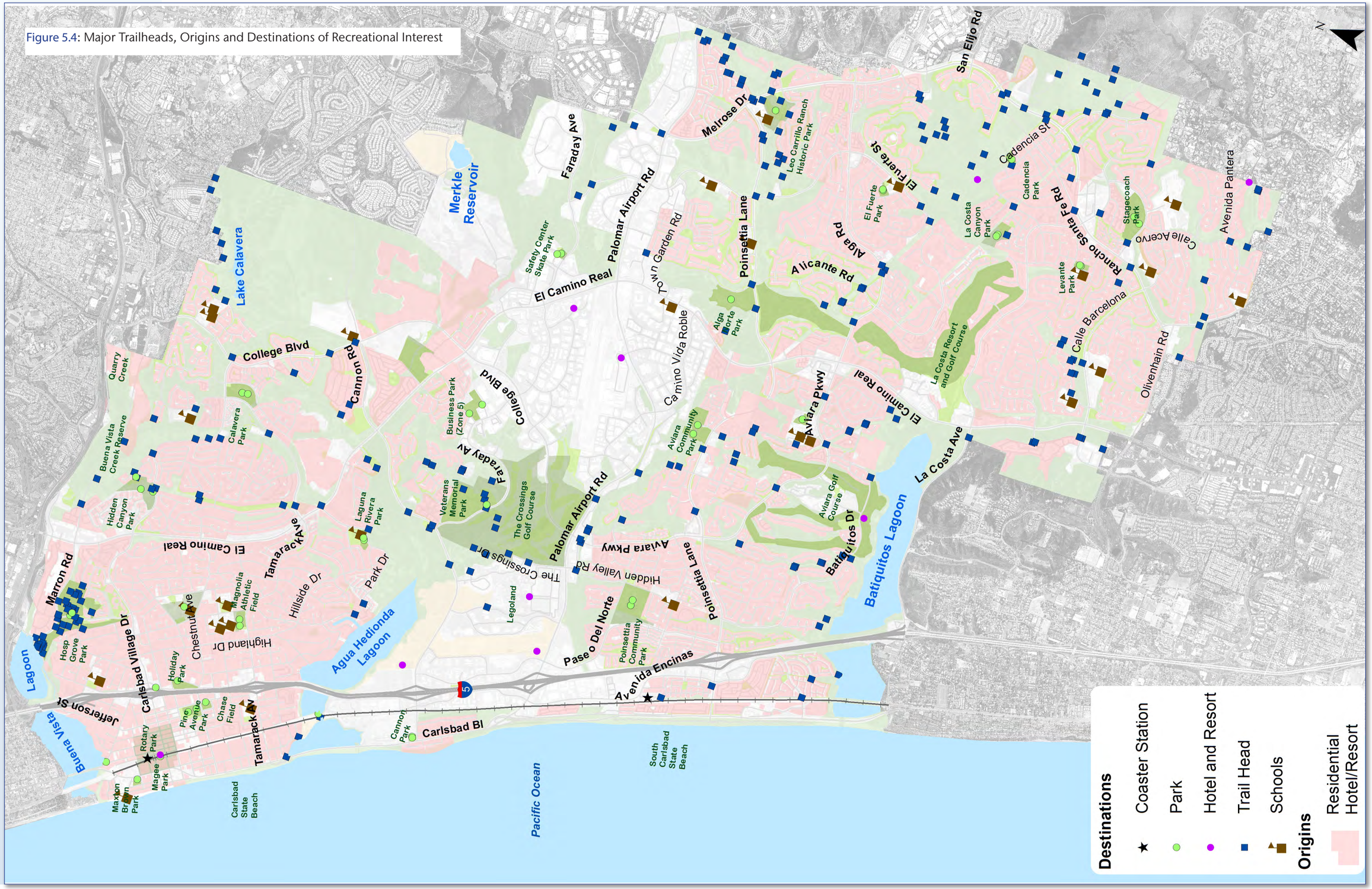


Figure 5.5: Habitat Management Plans and the Preserve System

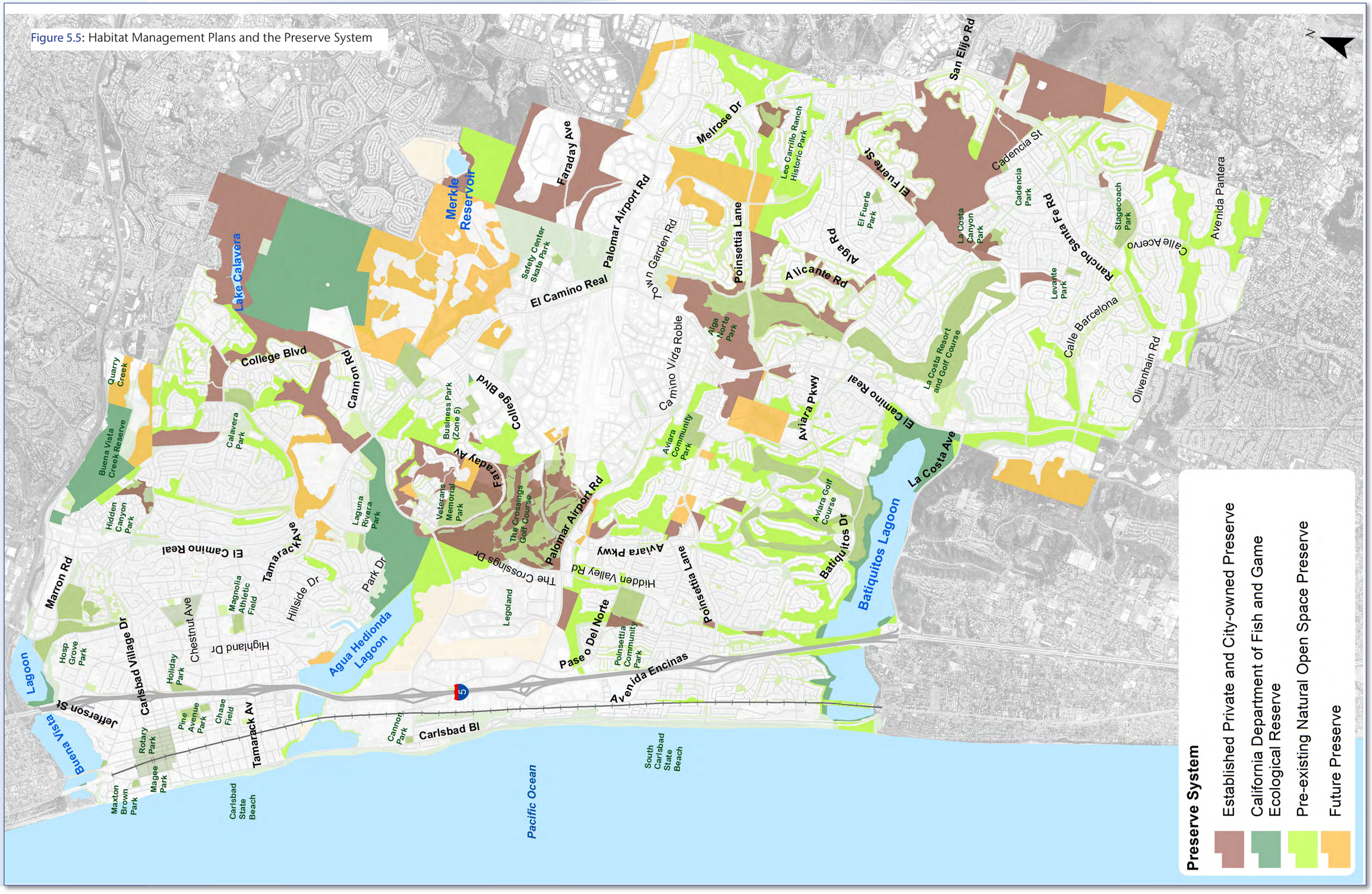


Figure 5.6: 10 Minute Walktime Zones from Existing Trailheads

Chapter 6

Future Trail Recommendations

6 Future Trail Recommendations

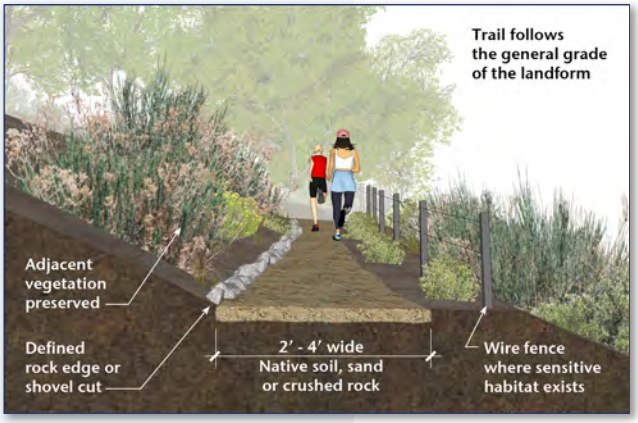
The focus of this plan is to recommend additional trails that will help to complete the trail system that has been steadily increasing in mileage and functionality. A formal trail system did not occur prior to 1990. The 1992 Open Space and Conservation Resource Management Plan (OSCRMP) put the city on course for an extensive trail system. The development of much of Carlsbad occurred after 1990. The inclusion of a defined plan helped direct new development and assure the inclusion of trail easements and construction as part of new neighborhoods. Although significant portions of Carlsbad will include future construction and development, the focus of the trail program efforts now are on connecting existing trails and the closure of gaps between existing trails. The plan also recommends expanding the trail and open space experience by using utility roads (Type 3), and better connected multi-purpose trails (Type 6).

A second focus of the plan is to develop trails in loop systems, where users have a variety of hiking routes to choose from and where the number of dead ended trails are minimized. Loop trails also provide the comfort of knowing that the trail will bring them back to the starting point, thus reducing the chance of becoming lost.

A third focus of the plan is to extend the trail system out and away from trailheads towards where trail users live. This is accomplished through the increased reliance on roadside trails (Type 4) and connecting sidewalks and special street crossings (Type 5). This approach extends the trail system by using existing paths wherever possible, perhaps enhancing them with signage and improved street crossings. This approach can also result in less driving to trailhead parking lots and help to reduce impacts on existing neighborhood parking areas. This approach can help to lower overall vehicle miles traveled, which will in turn reduce green house gas emissions. Finally, a connected system that allows the exercise and recreation experience to start at a persons front door instead of at their car door, will encourage more people to participate in healthy activities such as walking and bike riding to destinations.

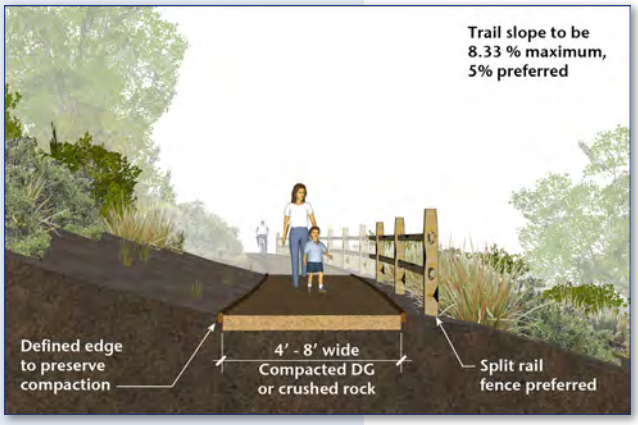
A final focus of this plan is the continued implementation of a trail classification which communicates to trail users information about the conditions of the trail such as the difficulty level, the surface treatments of the trail tread and the overall width and expected grade. This information will help the user to determine the type of recreation they want to engage in such as a family bike ride, run with a jogger or a mountain bike adventure. The trail classification system helps more clearly define the conditions of the trail to its potential users. The classification system can also accommodate the requirements of the American with Disabilities Act (ADA) by identifying trail types compatible with ADA design requirements for the maximum slope, trail surface and accessibility standards.

6.1 Standards for Trail Type 1- Nature Trail



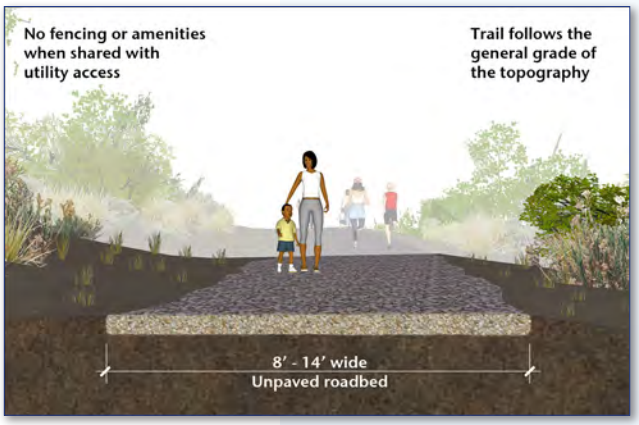
The primary focus of this trail type is nature appreciation and education. These trails should be kept to a minimum of width and without railings or fences (unless next to sensitive habitats) in order to maximize the trail user experience and limit the amount of disturbance in natural areas. Fencing is allowed and suggested, but fence types that are visually obtrusive could restrict the movement of wildlife (such as chain link fences) and are discouraged. The objective of the trail is to have the least impact on the adjacent sensitive or natural resources of the area. As such, grading would not require making trails level and in many cases, the trail would not meet ADA requirements since implementation of these grade restrictions would result in damage to natural resources and a change in character of these natural areas. Public education and interpretive panels are highly recommended. It is important to promote education and environmental sensitivity through interpretive signage and the overall experience of the trail users. The trail surfaces should be soft surfaces since ADA use and commute-based bike use are not anticipated. Abrupt changes in elevation, path obstructions and trip hazards should be expected by trail users, mountain biking and equestrian use would be allowed, if authorized by the city in specific locations. Regular road bikes or commute / hybrid bikes are not likely to be able to pass through these soft surface and highly changing trails. Trail widths should be minimal, down to two feet in some cases. The need to accommodate side by side walking is not a priority. Width for two hikers passing can be as little as two feet in a natural setting. Amenities are kept to a minimum, although trailhead kiosks, trash containers, regulatory signs, interpretive panels and viewpoints should be provided. No lighting is desired. Off-street parking is generally not needed unless the trail connects to a variety of other trail types that may generate larger than normal trail user levels.

6.2 Standards for Trail Type 2- Recreation Trail



A recreation trail is intended to be a firm surface trail type that meets the grade limitations of ADA (less than 8.33%) and constructed of a compacted chipped stone or compacted decomposed granite that a wheelchair, wide-tired jogger or medium-tired bike can maneuver. Even though these activities can be accommodated on this type of surface, the trail will still compress and be relatively loose, so highly efficient travel and speeds are not likely. The intent of the trail is to provide a uniform improvement that provides direct or indirect access to parks or through open spaces. An edge definer such as split rail or peeler log with notched vertical posts should be included on at least one side. The trail needs to be wide enough to accommodate multiple users walking together or for bikes to pass a group of two walkers or to make sure there is enough width to allow for two opposing directions to pass each other safely. At the same time, the trail is not intended to be wide enough for vehicular travel or maintenance vehicles. Trails need to keep the balance between the desire to limit impacts on the natural environment and preserve the proper scale user experience with the ability to accommodate a broader spectrum of users and use levels.

6.3 Standards for Type 3- Dirt Trail or Utility Roadbed



This trail type primarily consists of easements and unpaved utility roads scattered throughout the community. Because of the history of the various incarnations of the Encina Power Plant, the need for significant regional transmission facilities is obvious. Instead of following closely along a few corridors, these utility line corridors tended to quickly split along diagonal lines leading away from the power plant. Most cities often have a difficult time arranging for trail use within these utility easements. However, with persistence and the proven track record that Carlsbad has had with SDG&E and its parent company, Sempra Energy, these trail types are considered to be feasible. The wide range of state and federal laws that protect easement holders and property owners from liability associated with public use of private lands or easements is clearly ingrained in the legal system and should make it easier to obtain these public use agreements. The current utility corridors have extensive use already, but a more clearly defined and mapped system would enable the city to post regulations, thereby further decreasing liability and risk.

The overall width of this trail type is generally enough to accommodate wide utility maintenance vehicles. The surface conditions (gravel) may often be too loose for many uses to travel through comfortably. The steepness of many of these utility road segments is such that some users would find them challenging. Because of the diagonal orientation that crosses a generally trending east/west and north/south street orientation, these trails may cut down on the overall length of these routes compared to on-road routes. This phenomenon would indicate some potential use of these trails for circulation purposes, although if this is the case, then a Type 2 or Type 6 system may need to be designated along these routes.

6.4 Standards for Type 4- Roadside & Connector Trails

Carlsbad has been the pioneer in the region for establishing great examples of roadside trails. Many municipalities have meandering walkways or equestrian trails along many of its roads. But not many have the look and appearance of a soft surface natural trail, while offering the performance of a firm surface. The intent of the Type 4 trail is to be located along a highly traveled road but in a manner that is well buffered from the roadway. This requires both a visual separation between the roadway and the trail, as well as physical barriers that make the trail user feel comfortable that they are protected from vehicular collisions. The use of trees in the buffer area should be more frequent. Trees provide a protective barrier against vehicles that may leave the road surface.

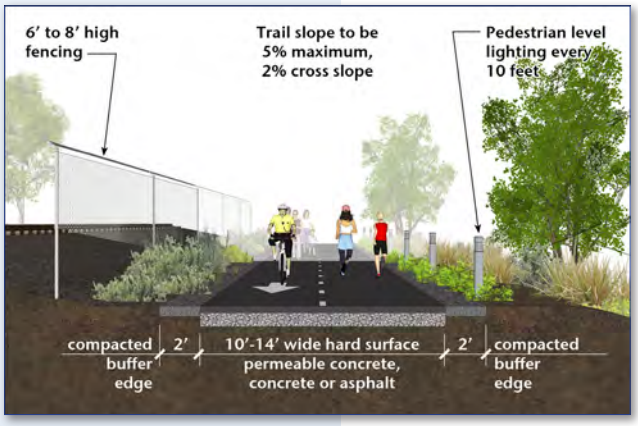
This category of trail also includes the simple designation of existing walkways and sidewalks as Type 4 connectors. This may require nothing more than signage that provides the casual user with wayfinding direction. Not all on-street or near-street roadside trails have been suggested for designation, but many of the streets have been designed to a standard that fit into this category. If they do not connect with existing or proposed recreational trails, then they have not been classified as a Type 4 trail.

6.5 Standards for Type 5 - Connecting Sidewalks and Special Street Crossings

A Type 5 trail is intended to support near roadway connections by pedestrians, in order to walk to other open space trails and trailheads. The trail type should be considered serving the same function as a Type 4 trail that connects to various types of other trails, but a Type 5 does not provide any real trail experience. However, it does provide a way of connecting to the open space and trail system and it provides looping opportunities that allows for a way back that may be different from a trail out. These trails are really sidewalks. It should be noted that not all city sidewalks fall under this category. Just those sidewalk systems that can help tie together a number of open space, beach and park uses.

This category also includes a number of in the road trail crossings that utilize either a signalized intersection, an intersection controlled by stop signs or a mid-block crossing that utilizes either a HAWK (Pedestrian Hybrid Beacon) or a Rectangular Rapid Flashing Beacon (RRFB).

6.6 Standards for Type 6- Paved Multi-use Path or Trail



This trail type is the ultimate in accommodating a variety of user types in an efficient trail surface. For some, the level of improvement is not consistent with their trail user experience desire. But for others, especially those on bikes, is superior to roadside bike systems that are exposed to fast moving vehicles. This trail type needs to follow Class 1 Caltrans standards. Bikes of many kinds will utilize this type of facility, as will many of the other wheeled uses such as skateboards, in-line skates and running strollers. Because of the potential speed differences between users, a centerline and directional arrows are required. It is also suggested to include a soft surface side trail for runners and hikers who would prefer a slightly softer surface. By its very nature, this trail type can and should be used as a circulation-based trail that provides direct and protected connections between major destinations and regionally traveled bike corridors.

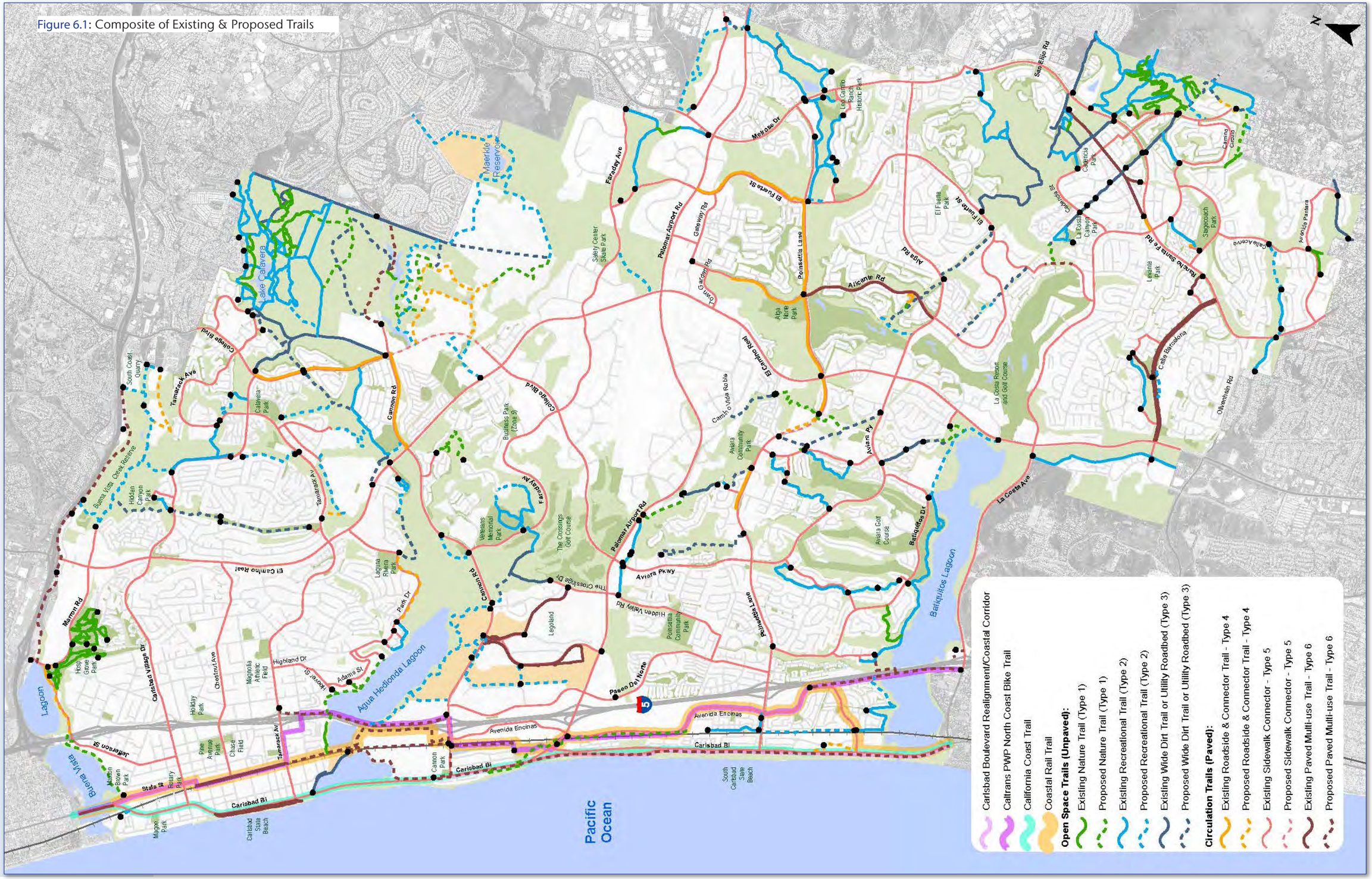
6.7 Composite of All Trail Types

"Figure 6.1: Composite of Existing & Proposed Trails" is a composite map of all existing, proposed on disturbed and proposed new construction identified by Trail Type with a background segment color if they are also trails of special designation. For a quantification of existing and proposed trails, please see "Table 6.1- Summary of Existing and Proposed Trails" and "Table 6.2- Adjusted Trail Summaries based on Trails with Trails Like User Experience".

6.8 Subarea Future Recommendations

The following pages discuss the distribution of trails within each of the 13 subareas identified in this plan. Each subarea represents the desire to have a distributed open space and trail system in close proximity to the local population. The 13 subareas have also been summarized on "Figure 6.2- Trail Subarea Map".

Figure 6.1: Composite of Existing & Proposed Trails



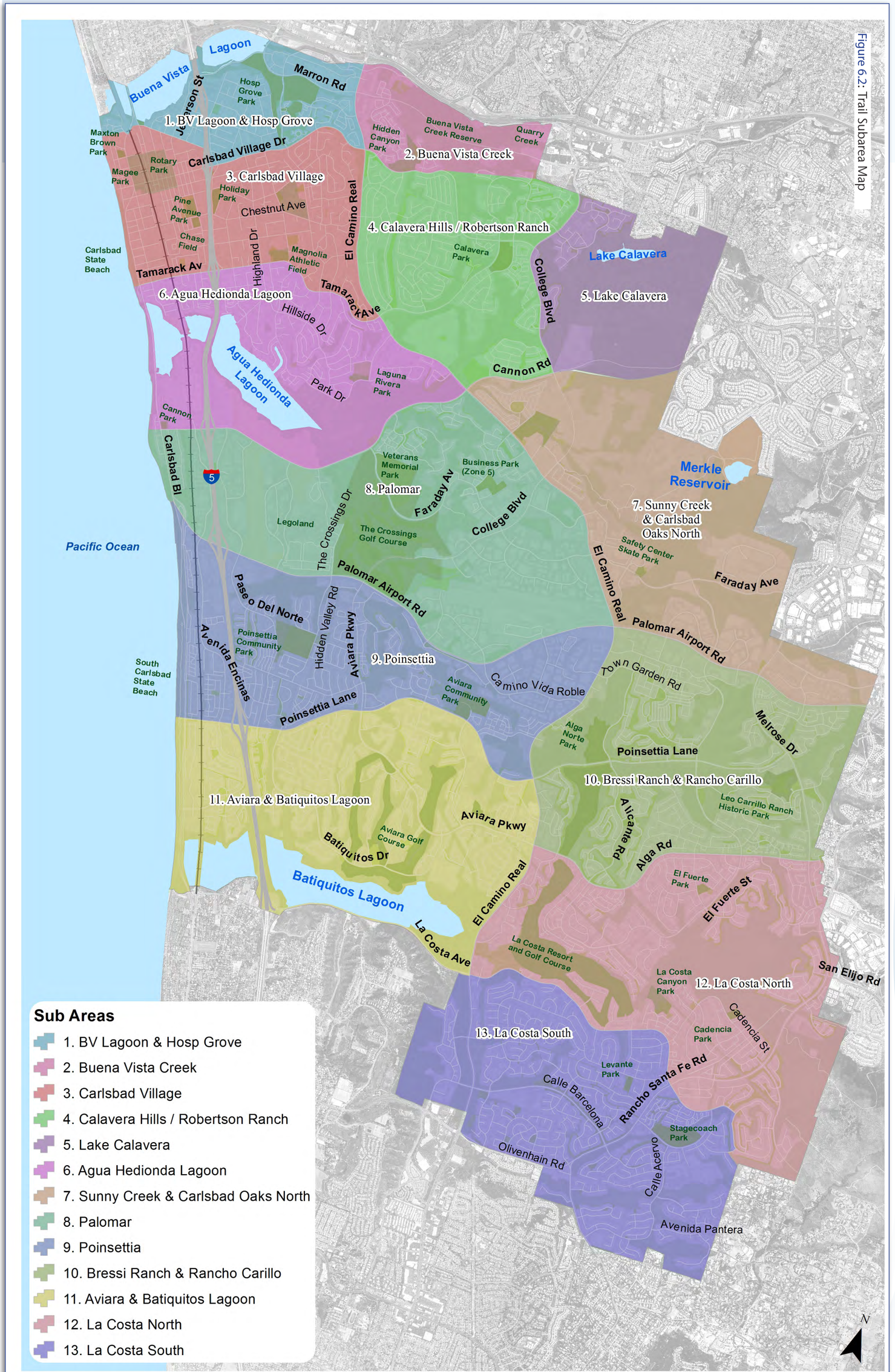


Figure 6.2: Trail Subarea Map

Table 6.1: Summary of Existing and Proposed Trails

MILES OF OPEN SPACE (UNPAVED) RECREATIONAL TRAILS					
			Existing	Proposed	Total
1	*Nature Trail*		10.9	9.5	**20.4**
2	*Recreation Trail*		30.8	19.9	**50.7**
3	*Wide Dirt Trail or Utility Roadbed*		10.2	11.4	**21.6**
	Total Miles of All Open Space Trails		51.9	40.8	**92.7**

MILES OF CIRCULATION (MOSTLY PAVED) TRAILS					
			Existing	Proposed	Total
4	*Roadside or Connector Trails*		5.9	5.0	**10.9**
5	*Connector Sidewalks*		Since this trail type is not a complete trail experience, it is not counted in the total trail miles below		
6	*Multi-use Paved Path or Trail (Class 1)*		9.9	14.6	**24.5**
	Total Miles of Circulation Trails		15.8	19.6	**35.4**

	Existing	Proposed	Total
GRAND TOTAL MILES OF TRAILS AT BUILT-OUT	**67.7**	**60.4**	**128.1**

Subarea 1: Buena Vista Lagoon & Hosp Grove

Buena Vista Lagoon is a visually dominant element of this subarea, although it cannot be seen from many locations until you are at its edge or on a slope overlooking the lagoon. Hosp Grove, with its very mature eucalyptus trees, creates a large shaded area environment that is interesting to walk through (see "Figure 6.3: Subarea 1 Map").

General Recommendations

The major changes in this area include extensions of connections to the lagoon by way of Jefferson Street, trails along Buena Vista Creek, connections that provide a loop using both Buena Vista Creek and trails within the redeveloped South Coast Quarry to the east, and connections with Hidden Canyon Park and trails.

Subarea 1 General Description: Walk along the edge of Buena Vista Lagoon or view it from the Eucalyptus forest found within Hosp Grove. Follow along Buena Vista Creek at the north edge of the City of Carlsbad to connect with other natural areas, creek corridors and hills to the east. You can also reach the beach at the north end of Carlsbad.

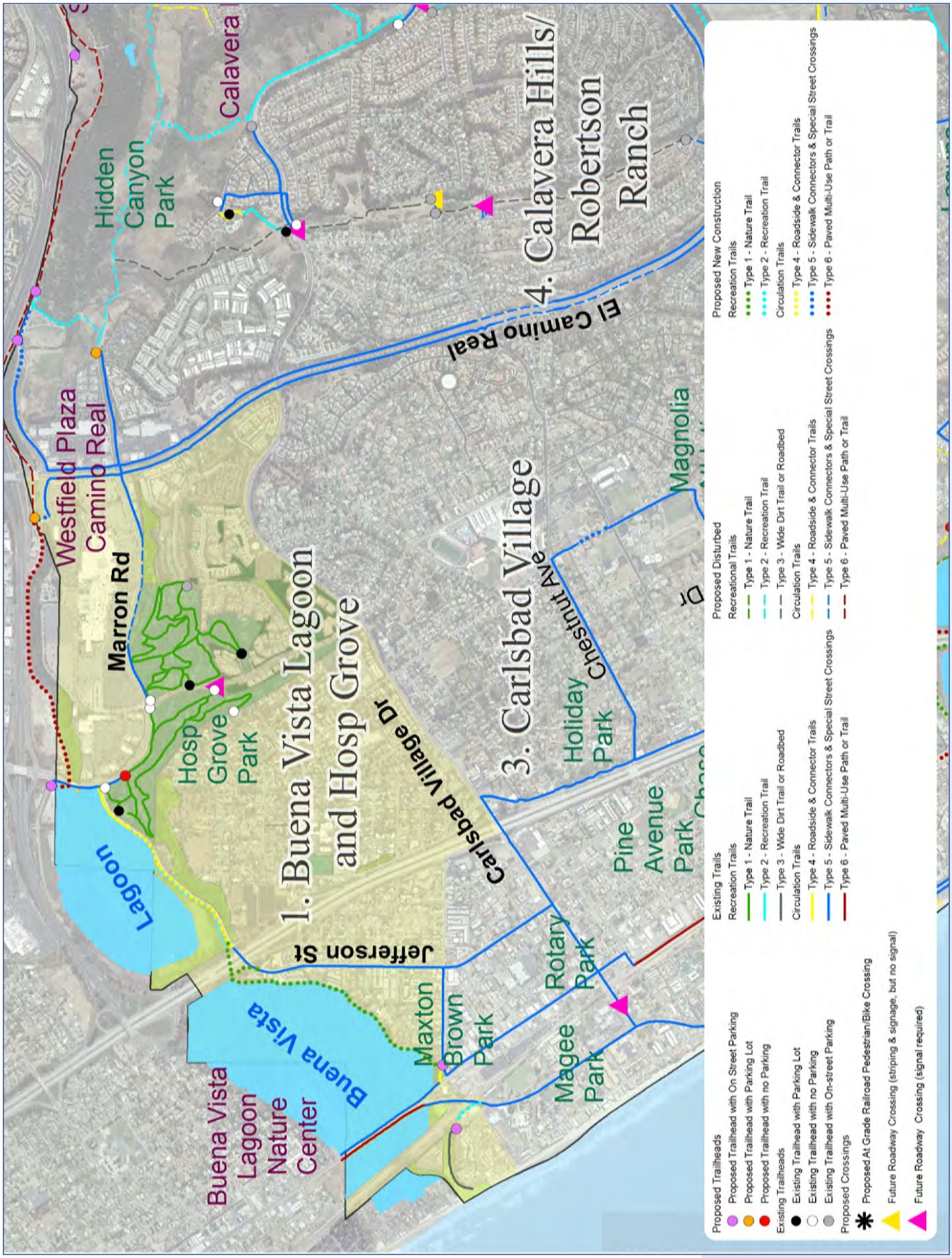
Destinations: Buena Vista Lagoon, Buena Vista Creek, Hosp Grove, Westfield Plaza Camino Real and the beach.

Range of Difficulties: Moderate to steep trails leading through Hosp Grove. The rest of the trails in this subarea are relatively flat. Much of the trails are shaded in the grove.

Range of Surface Types: Most of the trails in Hosp Grove are soft surface trails with the more heavily used trails slightly compacted. The beach trails are compacted soil with a fair amount of sand. The Buena Vista trails include some gravel areas in the existing roadbed sections.

Possible Loops: A loop can be made from Hosp Grove West to East using the proposed mid-block crossing. Several miles of trails can be joined to make a longer trail experience. A loop will be possible in the future around the shopping center, north along Buena Vista Creek and then back along Marron Road. A small loop uses Jefferson and Laguna Drive with a segment along the south edge of the west end of the Lagoon.

Figure 6.3: Subarea 1 Map



Subarea 2: Buena Vista Creek

The Buena Vista Creek Subarea includes the Buena Vista Creek along the north edge of the study area, of which portions are actually outside the City of Carlsbad boundaries. The area is mostly arranged around landforms between housing developments to the south, the South Coast Quarry in the center, and intensive apartment development to the west. Highway 78 is to the north. Much of the area is currently undeveloped, but will be developed in the near future (see "Figure 6.4: Subarea 2 Map").

General Recommendations

Since much of the area has not been developed, it is important to decide now what is expected through this area before plans are completed and commitments for easements are finalized. Several easements have already been worked out on the property and have been shown on the Subarea 2 map.

Subarea 2 General Description: Discover Hidden Canyon and the views that the slopes in this area afford the trail user. Future conditions will provide access to Buena Vista Creek and connections to other parts of Calavera Hills to the south.

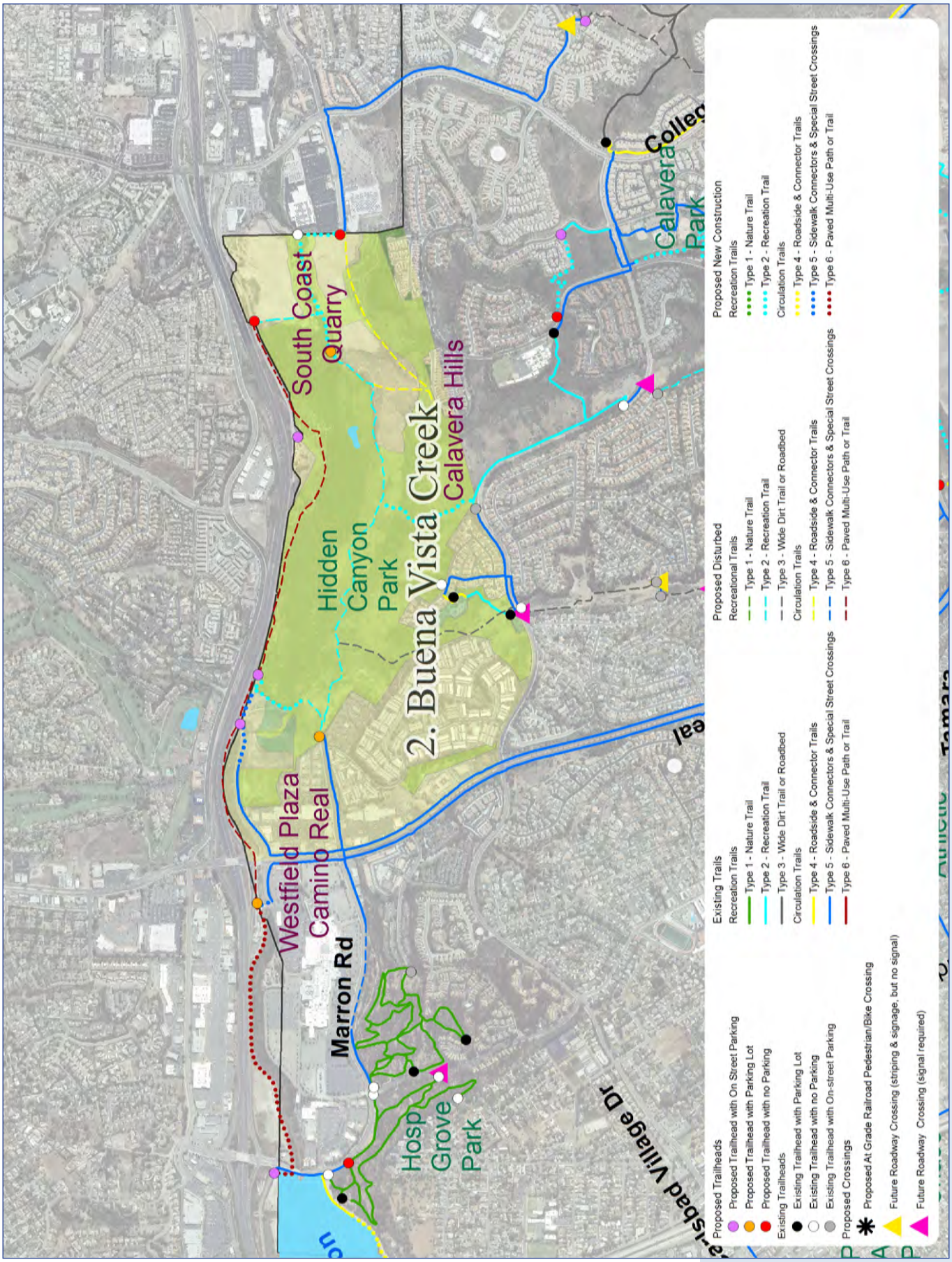
Destinations: Buena Vista Creek and adjacent canyons and hillsides. Connections to Westfield Plaza Camino Real are planned for the future as well.

Range of Difficulties: Moderately steep trails leading up Carlsbad Village Drive. Mostly level trails proposed through the former South Coast Quarry site.

Range of Surface Types: Most of the trails in this area are intended to be soft surface Type 1 with some firm surface trails (Type 2) and dirt roadbeds (Type 3) connected to provide a full trail system for the area. As such, trail surface conditions change fairly frequently.

Possible Loops: In the future, a loop around the entire former South Coast Quarry is possible. This would include Buena Vista Creek, a crossing of Buena Vista Creek to the east, then full routing through the future development project, back to Marron Road and El Camino Real.

Figure 6.4: Subarea 2 Map



Subarea 3: Carlsbad Village

At the heart of Carlsbad, the trail systems in this area will provide access around downtown and to parks and the coastal bluffs and beaches. An important segment of the Coastal Rail Trail is also at the center of this subarea (see "Figure 6.5: Subarea 3 Map").

General Recommendations

The primary focus of this plan area relates to completing the connections to major trail systems that already exist, such as the Coastal Rail Trail and the Carlsbad Boulevard seawall walk and upper bluff walk. Future connections for on-road bike facilities (Type 5) are also proposed by Caltrans.

Subarea 3 General Description: Connect with the heart of Carlsbad, and enjoy the local charm of Carlsbad Village. Use the Coastal Rail Trail or, if you want to see more blue, walk along the seawall or on top of the coastal bluffs along Carlsbad Boulevard.

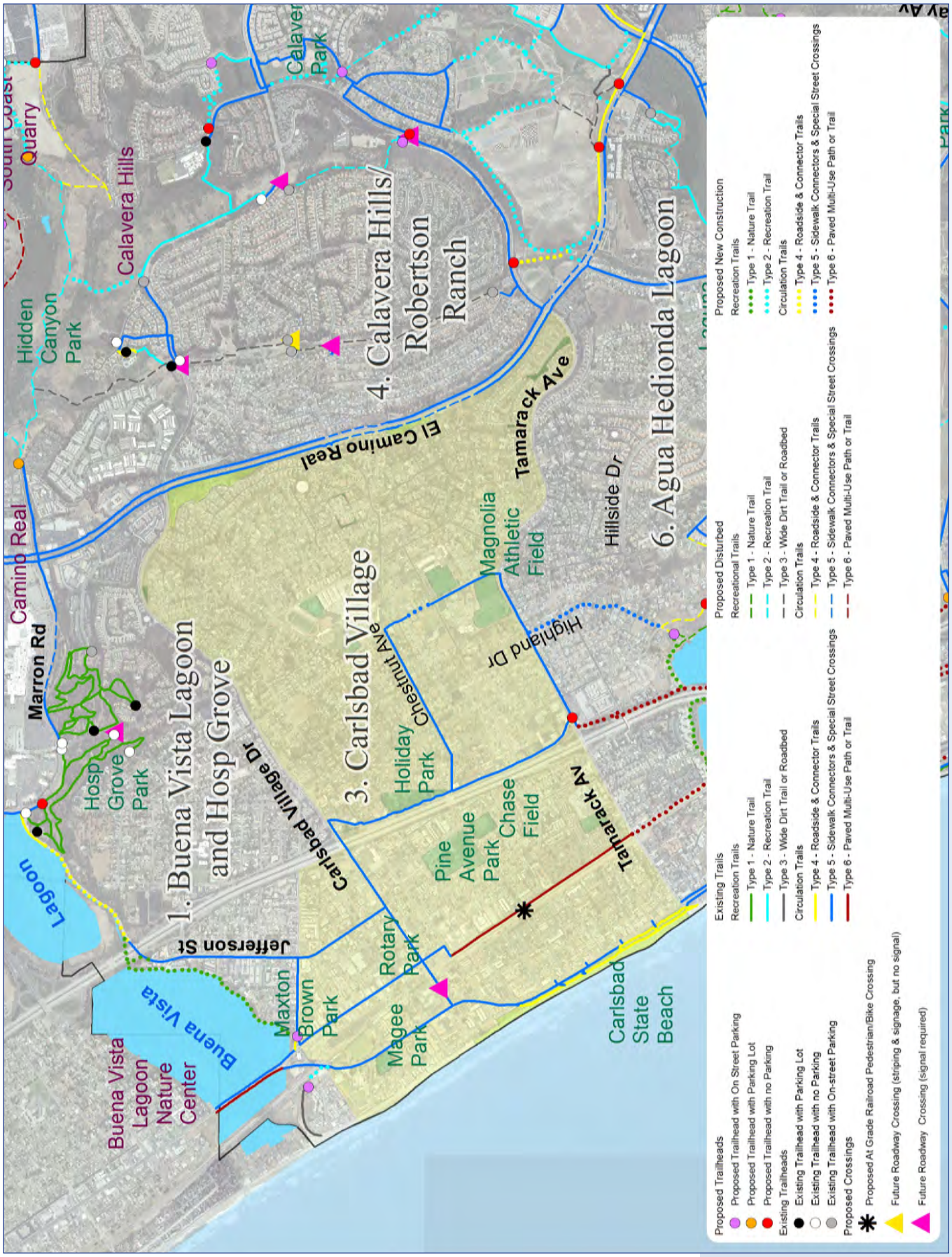
Destinations: Various downtown destinations including the Coaster station, hotels, shopping, various parks and of course, the beaches.

Range of Difficulties: All trails in this subarea are mostly flat with the exception of ramps leading to the Seawall walk.

Range of Surface Types: All trails in this area are considered to be hard surface asphalt or concrete. These surfaces accommodate all trail users although bikes should utilize Carlsbad Boulevard and other key streets. Only pedestrians are allowed on the Seawall trail.

Possible Loops: Various loops are possible, especially if you tie together the coastal bluff trails on the west with the Coastal Rail Trail on the east. Urban walks are possible throughout the area, including one that will get you up to Buena Vista Lagoon and out to the north end of Carlsbad's beaches.

Figure 6.5: Subarea 3 Map



Subarea 4: Calavera Hills / Robertson Ranch

Calavera Hills has some of the most progressive trail systems in the city. This is a result of the development that has occurred and the integration of trails into the site planning and construction of these new communities (see "Figure 6.6: Subarea 4 Map").

General Recommendations
There are a number of long canyons with trails, but they are not currently designated or have missing links and difficult road crossings. Since Roberston Ranch is still under development, many of these future trails will be or have already been incorporated into the proposed plans. El Camino Real is missing some significant walkway connections through this study area and future Type 4 roadside trails are recommended.

Subarea 4 General Description: Find your way through the neighborhoods and canyons of Calavera Hills. Distant views to the north and then again to the west are available when you reach the summit of some of these hills.

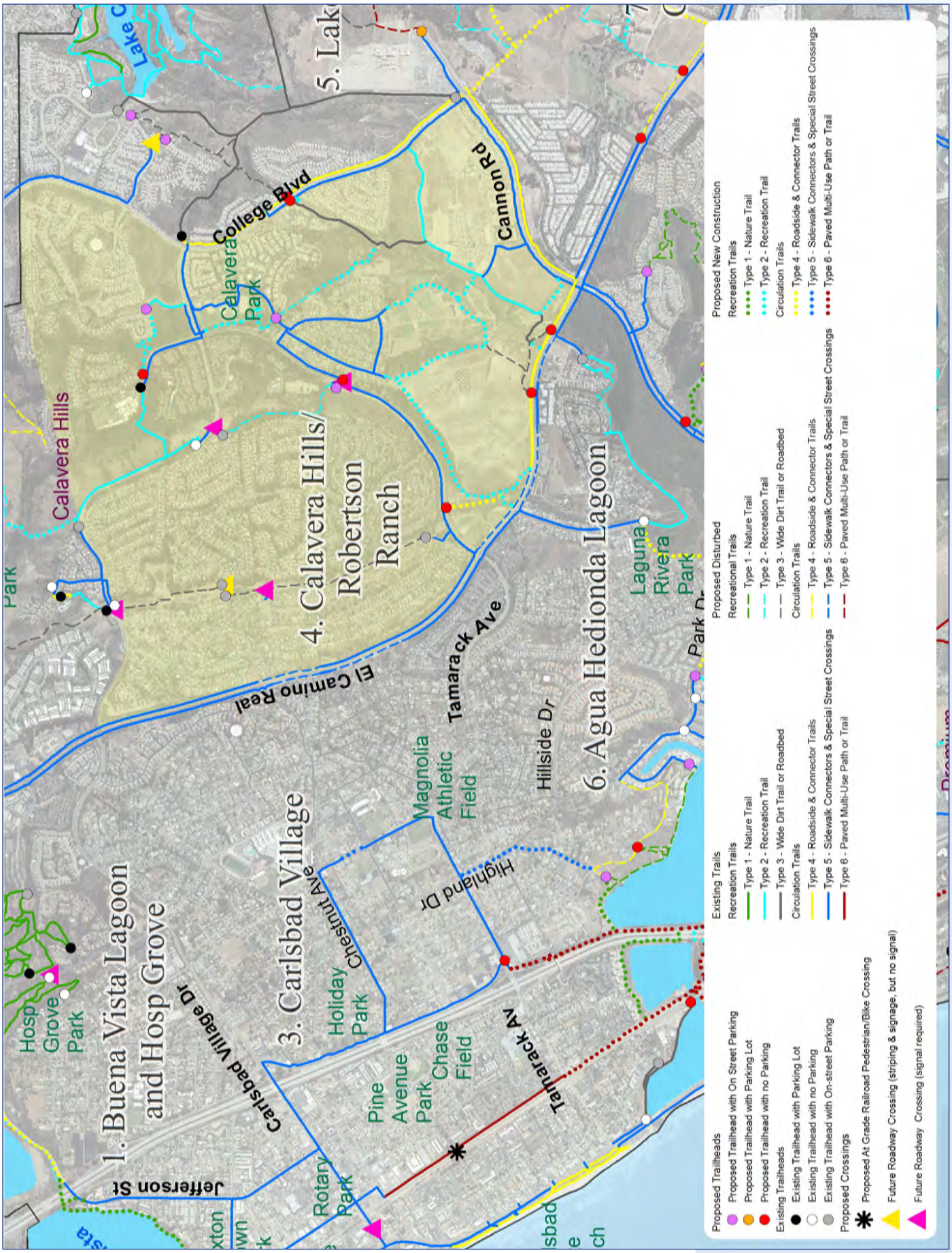
Destinations: Various parks and schools are located in the area, along with community gardens and natural open space areas.

Range of Difficulties: Most of the trails follow the grade of the adjacent road and are moderately steep, but should be achievable by most trail users.

Range of Surface Types: Most trails in this subarea are highly compacted decomposed granite trails. Most bikes can use these trails unless the bike has very high pressure and narrow tires. On-street bike connectors do not exist in this area, although various bike facilities exist along roadways. These bike facilities are not critical links to these trail systems.

Possible Loops: With the completion of Village H North canyon based Type 3 utility road and Type 2 recreational trails, it will be possible to use some of the north / south canyons to make a paired loop using Carlsbad Village Drive Type 4 trails on the north and Tamarack on the south to connect these two canyons. Future loops will be available around new development in the Robertson Ranch area.

Figure 6.6: Subarea 4 Map



Subarea 5: Lake Calavera

The Lake Calavera Subarea has the highest concentration of trails compared to any other subarea in Carlsbad. These trails provide access to several diverse and scenic areas and are used by residents in Calavera Hills and San Marcos to the east, as well as visitors (see "Figure 6.7: Subarea 5 Map").

General Recommendations

Since this area has many miles of trails scattered throughout the natural open spaces of the subarea, very few new trails are needed. In fact, because of erosion problems and conflicts with some of the preserve priority goals in this area, some trails have been blocked off in the past. The extensive number of volunteer trails indicate that trail users were creating new trails that are impacting the natural resources and sensitive habitat protection goals of the preserves. But blocking all of the trails off is not the answer either. The preserve managers, city staff and interested mountain biking and hiking groups should all work together to agree on what trails should be closed, which ones will need enhancements and where new connectors may be warranted. If the advocate groups work with the city to help remove some of the duplicate and damaging trails from this area, then adding more responsible trails would be possible, especially with the volunteer help of many of the mountain biking club members interested in having more trails in this area.

Subarea 5 General Description: A volcano, a lake, wetlands and rolling hills await you, with many trail choices that will entice a broad range of users to this subarea.

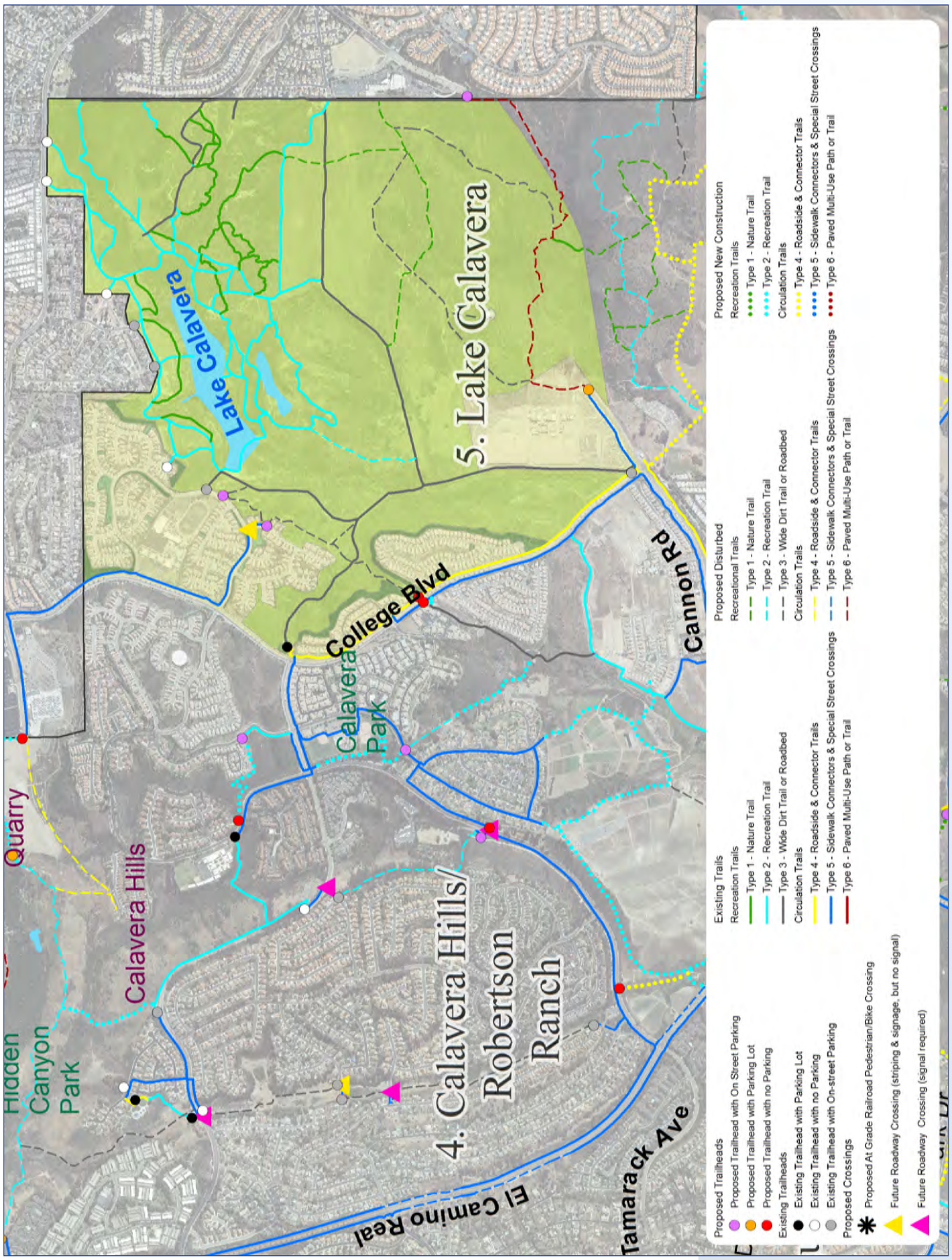
Destinations: Lake Calavera and the 22 million year old volcanic plug, as well as creeks, riparian areas and distant views.

Range of Difficulties: Some of the trails in this area are steep and taxing to the inexperienced trail user. Other trails are moderate in difficulty and should be hikeable by most trail enthusiasts.

Range of Surface Types: Compacted native soils and some gravel areas dominate on most of the existing trails.

Possible Loops: Nice loops already exist around the lake and if, College Boulevard is used to complete the loops, several major north and south trails can be paired up with the Type 4 trails along College Boulevard.

Figure 6.7: Subarea 5 Map



Subarea 6: Agua Hedionda Lagoon

One of the rare recreation-based lagoons in Southern California is represented by Agua Hedionda. This lagoon receives year round recreational and boating use by residents and visitors. Though access to the water is open in several areas, trail access along its northern and southern edges is surprisingly limited. Future development of the strawberry fields may change this, along with proposed trails planned by Caltrans. (see "Figure 6.8: Subarea 6 Map").

General Recommendations

This is the missing link for the Coastal Rail Trail and other future trails through the area. The Encina Power Plant has created barriers to north / south travel through this area, along with the fact that the lagoon slopes are steep and the I-5 freeway has no current underpass capability. With the decommissioning of the power plant, the expansion of I-5, an increased focus on the completion of the Coastal Rail Trail, and the LOSSAN double tracking and improvement projects, several viable connections through this missing link are possible.

Subarea 6 General Description: A rare opportunity to get close to (and actually in) a coastal lagoon. Current trails are limited to the west end of the lagoon, but future trails will eventually allow for access around most of the lagoon.

Destinations: Carlsbad beaches and coastal bluffs to the west, the existing Coastal Rail Trail to the north and the recreational waters and beaches associated with Agua Hedionda Lagoon. A connection to the existing Agua Hedionda Discovery Center is possible as well.

Range of Difficulties: Mostly level trails leading around parts of the lagoon.

Range of Surface Types: Very soft sandy surface trails exist in this subarea. Type 4 trails are often firm surface DG trails. Type 5 trails are typically asphalt or concrete.

Possible Loops: The variations of the Coastal Rail Trail and the Carlsbad Boulevard Realignment Coastal Bluff trails will allow for significant loops through this area. The addition of the strawberry fields north shore trail and the Caltrans I-5 bridge modifications and underpasses will allow for several loops, including a figure eight around the full length of the lagoon.

Figure 6.8: Subarea 6 Map

Subarea 7: Sunny Creek & Carlsbad Oaks North

The Sunny Creek Subarea used to include a variety of mountain bike trails throughout various canyons, but these trails were lost when significant business park development occurred. Some remnants of these trails still exist and have been recommended for redesignation. A large portion of this area will be developed and will include roadway extensions and several trail dedications have already been arranged (see "Figure 6.9: Subarea 7 Map").

General Recommendations

The previously used Flightline Trail and other associated routes have been eliminated by development or restricted in some manner. Although the full extent of the original trails in this area cannot be preserved, some of the trails should be allowed and improved. Most of the improvements in the northwest corner of this subarea are dedicated as trail easements and will be built by the future development. Several areas south of Lake Calavera and south of Cannon Road are intended to be used as a variety of Type 1 trails that should include mountain bike uses. Areas to the north of Cannon Road in Subarea 5 will need to have more restrictive use and trail development because of the sensitive nature of this preserve area. However, areas to the south of Cannon Road should be considered for trail use. Another extension of a trail system up to Merkle Reservoir is proposed. A loop around the reservoir would need to be designed to avoid conflicts with the operations and security of the reservoir. A connection to the residential neighborhoods in San Marcos would also be a benefit for the region.

Subarea 7 General Description: Discover some of the hidden canyons and old agricultural farms of this more isolated portion of Carlsbad. In the future, head for the hills and take in the views from Merkle Reservoir.

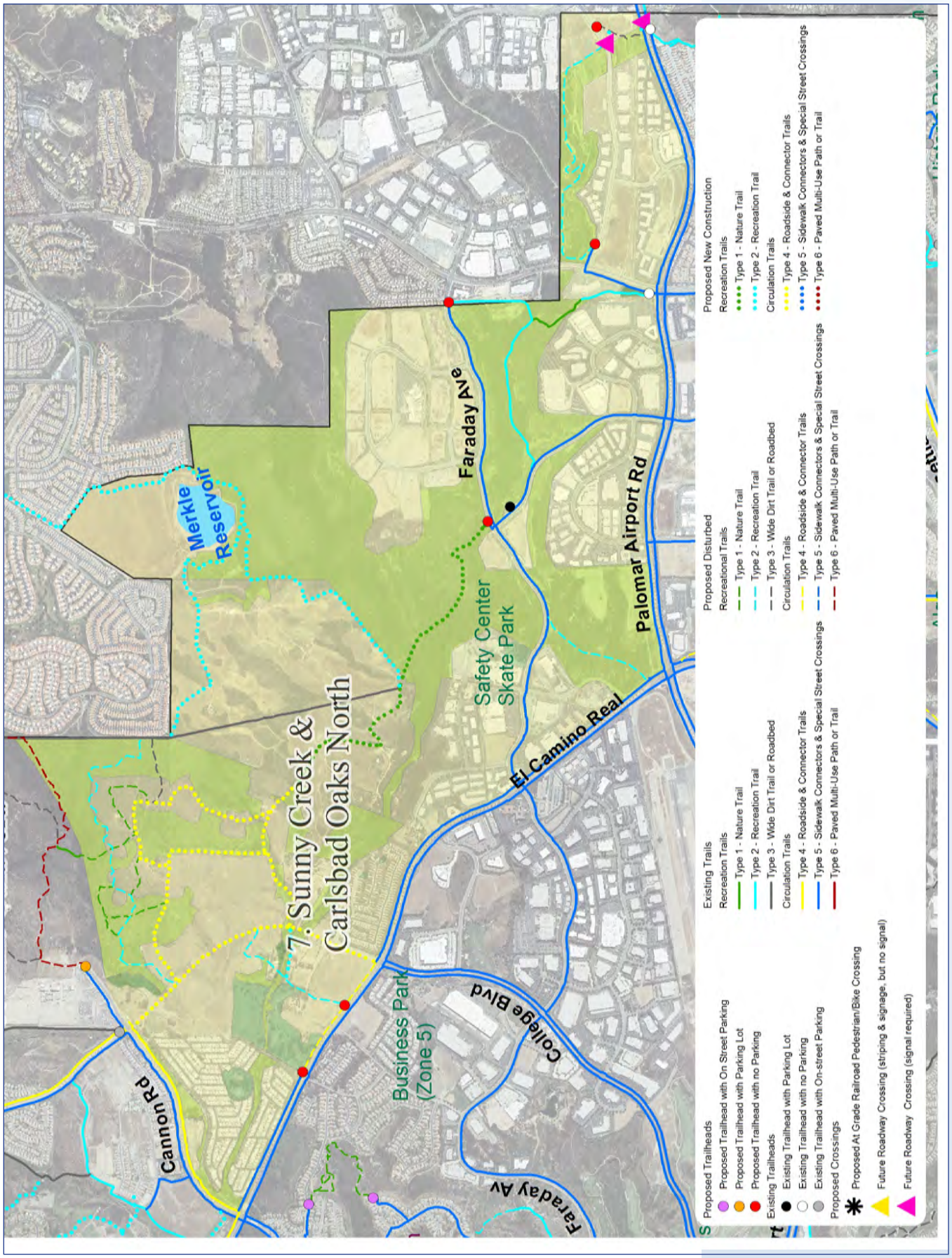
Destinations: Merkle Reservoir and the Safety Center Skate Park

Range of Difficulties: Moderately steep trails leading up to Merkle Reservoir.

Range of Surface Types: Future trails will include a variety of surfaces that will allow most bike use and all foot uses.

Possible Loops: Several loops have been provided in areas south of Cannon and Sage Creek High School.

Figure 6.9: Subarea 7 Map



Subarea 8: Palomar

Subarea 8 contains many tourist related destinations, recreation opportunities, retail and a major employment center. All of this activity is located next to the natural areas of Agua Hedionda Lagoon. The area also includes Palomar Airport. The area has significant topographic changes, although the tops of the hills and mesas have been graded to create a series of pads and slopes to accommodate the extensive business park (see "Figure 6.10: Subarea 8 Map").

General Recommendations

Most of the area is already covered by a variety of trails. A new Type 2 Recreation Trail is proposed along the west side of the flower fields pending future development. Additional options that extend the trails through The Crossings Golf Course are planned to go under the Cannon Road bridge. The completion of trails in Veteran's Memorial Park are also important, as are trails from the crest of the hill down to Cannon Road. Additional roadside trails are proposed along Cannon Road and can connect the natural areas and hillsides to the Agua Hedionda Discovery Center. Extensions of the Coastal Rail Trail and the Carlsbad Boulevard Realignment Study Coastal Bluff trail make up the majority of the changes on the west side of I-5.

Subarea 8 General Description: A lot is happening in this subarea. Climb to the top of Veteran's Memorial Park and see for yourself. Walk or ride some of the best looped trails that lead around Legoland and the flower fields.

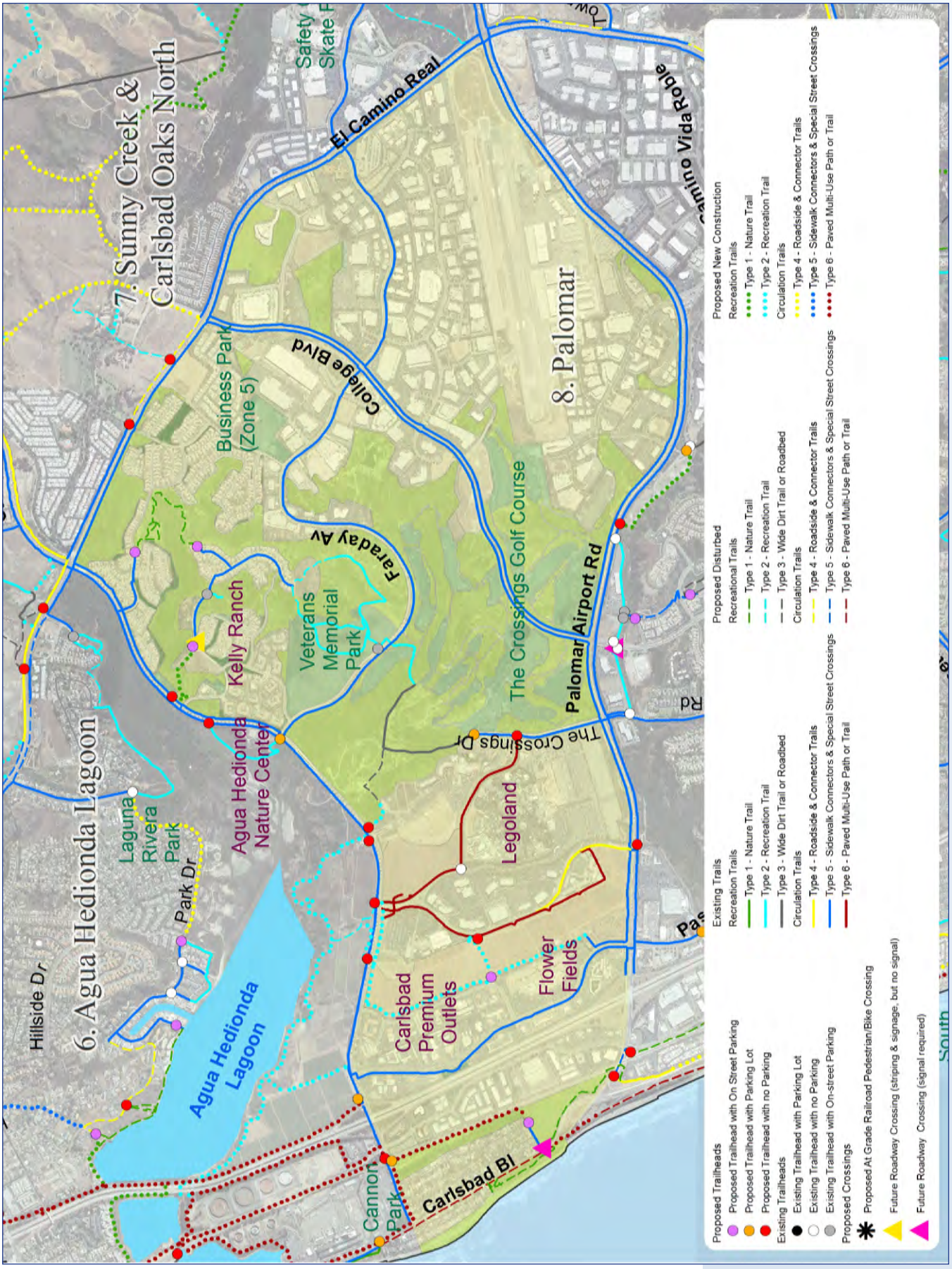
Destinations: Legoland, The Crossings Golf Course, Veteran's Memorial Park, Agua Hedionda Discovery Center, the flower fields, the Carlsbad Outlet Stores (including locations to eat), and the coastal bluff located west of Carlsbad Blvd.

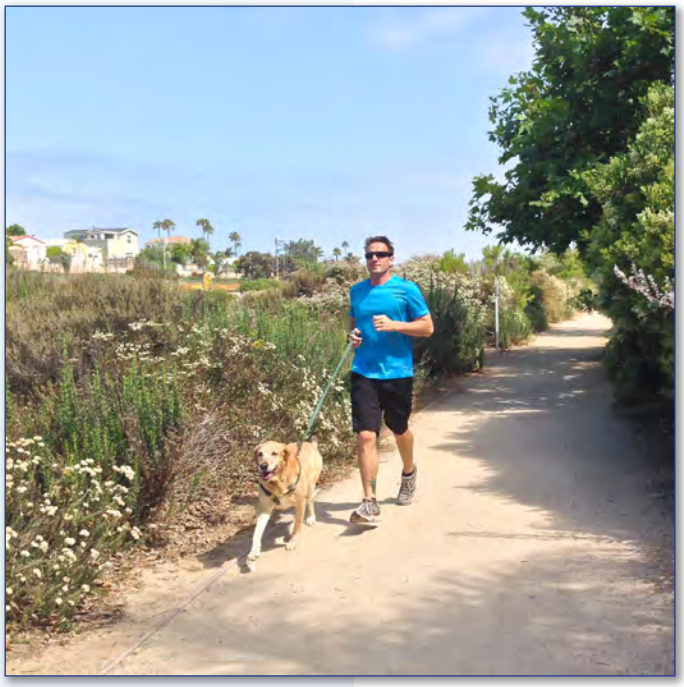
Range of Difficulties: Moderately steep trails leading up to Veteran's Memorial Park and south of The Crossings Golf Course. Most other trails are level or have gentle slopes.

Range of Surface Types: Trails around Legoland are hard surfaces. Trails along Palomar Airport Road are highly compacted firm surfaced. Segments of the Coastal Rail Trail and the Carlsbad Boulevard Realignment will be hard surfaces.

Possible Loops: Loop around the flower fields and Legoland already exist. Make a loop through the golf course, under Cannon Road and back to the Discovery Center along Cannon Road and through Veteran's Memorial Park. Create loops out of segments of the Coastal Rail Trail and the Carlsbad Boulevard new Coastal Bluff trail.

Figure 6.10: Subarea 8 Map





Subarea 9: Poinsettia

The Poinsettia Subarea consists primarily of residential neighborhoods with some commercial office west of I-5, along Palomar Airport Road and at the east side of the study area (see "Figure 6.11: Subarea 9 Map").

General Recommendations
Changes in this area include the extension of the Coastal Rail Trail, the creation of the Coastal Bluff Trail associated with the Carlsbad Boulevard Realignment Project, and several conversions of utility access roads into improved trails. An effort has also been made to extend the various trails along Palomar Airport Road to make the existing trail segments more usable. Caltrans is also proposing to improve Palomar Airport Road bridge, while the city is likely to demolish the existing bridge connecting Carlsbad Boulevard with Palomar Airport Road.

Subarea 9 General Description: The coastal bluffs of this subarea are its primary attraction. You can follow along creeks and open space when using trails along Palomar Airport Road.

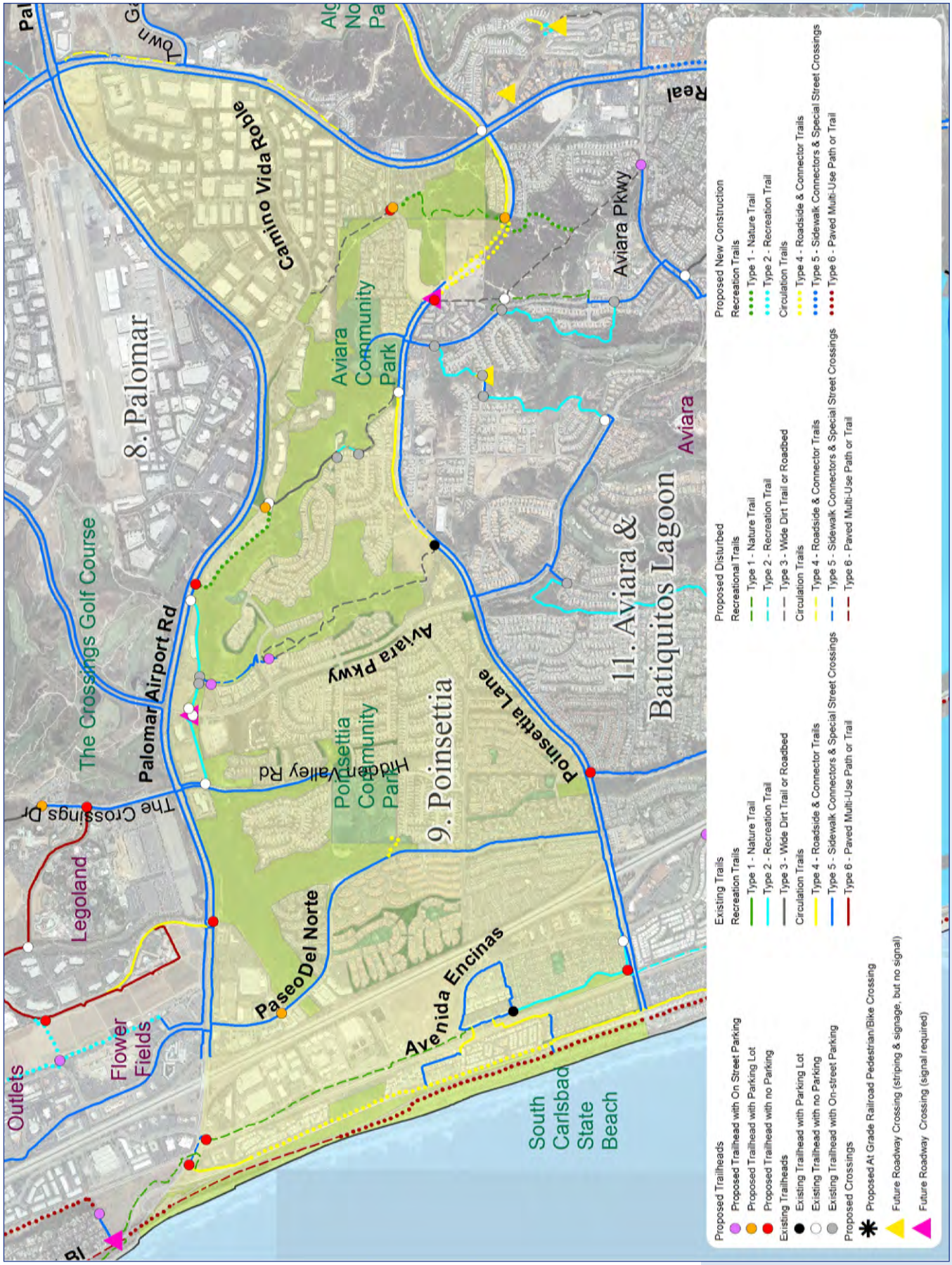
Destinations: Pointsettia Community Park, South Carlsbad State Beach and Aviara Community Park.

Range of Difficulties: Moderate slopes exist on the east end of the subarea while more level trails exist on the west.

Range of Surface Types: Many of the existing and proposed trails are hard or firm surfaces, allowing most bikes to utilize the trails. The trails along the utility access roads are very steep and mostly gravel and compacted native soils.

Possible Loops: Loops can be made by using the north / south open space trails, connected up with east / west circulation trails that are mostly along roadways. With several parallel facilities proposed along the coast, loops can also be created by using several segments of each specialty trail.

Figure 6.11: Subarea 9 Map



Subarea 10: Bressi Ranch & Carrillo Ranch

Leo Carrillo Ranch Historic Park anchors this subarea. The long east / west canyon that parallels Poinsettia Lane is a dominant landform for the area. The new Alga Norte Park is also another important feature along Poinsettia (see "Figure 6.12: Subarea 10 Map").

General Recommendations

The primary recommendation for this subarea is to extend the trails to the west of Rancho Carrillo. Improving the diagonally oriented utility access road through this area is also an important aspect, although portions of the route are interrupted by a golf course. Some of the trails located along Poinsettia are actually more like Type 2 recreation trails, although the route is adjacent to a roadway. Another connection through the canyon east of Carrillo Ranch up to Palomar Airport Road may provide an important circulation connection through this area and is recommended to be a Type 6 multi-use trail.

Subarea 10 General Description: Visit Carillo Ranch and walk or ride a loop around this unique and historic Carlsbad treasure. Multiple trails exist around the new Alga Norte Park that can take you to the tops of this area's hills.

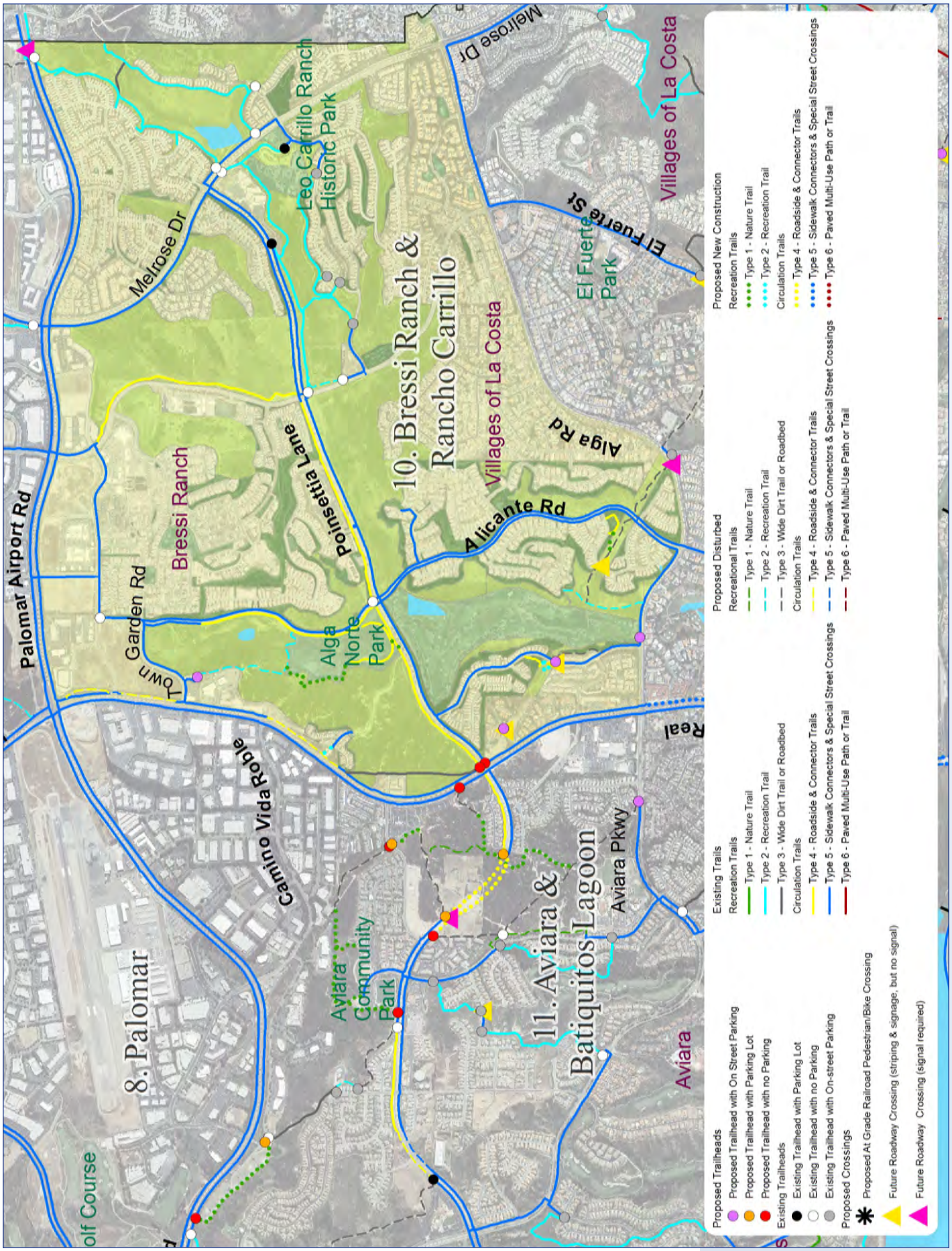
Destinations: Alga Norte Park and Leo Carrillo Ranch Historic Park

Range of Difficulties: The landforms of the area vary and include some steeper sections.

Range of Surface Types: The trails include chipped stone, asphalt and compacted decomposed granite which can handle most bikes except for high pressure narrow tires.

Possible Loops: Several existing loops can be taken around both Carrillo Ranch and Alga Norte Park. This plan recommends the extension of the Carrillo Ranch trails towards the west, which can result in another loop option.

Figure 6.12: Subarea 10 Map



Subarea 11: Aviara & Batiquitos Lagoon

Batiquitos Lagoon is a commonly viewed visual asset of Carlsbad, especially since it forms the southern boundary of the city. Some of the heaviest used trails can be found in this subarea. Although many of these trails are nature trails by the context of the setting, they are classified as Type 2 recreational trails because of their overall width (see "Figure 6.13: Subarea 11 Map") .

General Recommendations

Most of the trail system is well developed in this subarea. A connection to the west side of the lagoon is not currently possible, but as a result of planned improvements by Caltrans, access between the two sides and parallel to the bridge are now possible. Other general improvements include the use of the utility easement roads. This subarea also contains a recommended rail side Coastal Rail Trail alignment on the east side of the rail line located south of the Poinsettia Coaster Station.

Subarea 11 General Description: Serene views of Batiquitos Lagoon are available from several miles of trails either on the east side, or from the upper bluffs on the west side of I-5. Future connections will allow for even more access over and along the lagoon.

Destinations: Batiquitos Lagoon, Lagoon Nature Center and the Aviara Golf Course

Range of Difficulties: All trails in this subarea are mostly flat.

Range of Surface Types: Most trails are compacted native soil or decomposed granite. Most of the existing trails on the west side of I-5 are paved on-road bike facilities. Proposed Type 6 trails will be hard surface.

Possible Loops: Several loops already exist through Aviara, but these routes are not well marked along the roadway segments. A loop exists around the lagoon, but is not used by many on foot because of the adjacent high speed traffic. With the combination of the North Coast Bike Trails by Caltrans and the proposed Coastal Rail Trail and Carlsbad Boulevard Realignment Coastal Bluff trail, several coastal loops will be possible.

Figure 6.13: Subarea 11 Map

Subarea 12: La Costa North

La Costa North contains the second highest concentration of trails, although most are Type 1 nature trails on steeper hillsides. Significant open space resources exist, including the very large and steep Box Canyon area. The La Costa Hotel, Resort and Golf Course also comprises a large portion of the subarea. The area also contains two major utility corridors that contain utility access roads that are used by many trail users, although not officially designated. Another significant trail assets is related to the old Rancho Santa Fe road that has been re-purposed as a Type 6 multi-use trail (see "Figure 6.14: Subarea 12 Map").

General Recommendations

Most of the recommendations in this area are associated with turning the rough utility roads into more refined pathways and closing the gap of missing roadbed connections. In order to make this work, a number of mid-block crossings are needed to provide safer roadway crossings. Several survey comments asked for connections all the way around or across Box Canyon, but is not possible due to the steepness of the canyon and the sensitivity of the habitats in the canyon. However, some additional trails are proposed for the southeast side of the canyon and other loops are established by designating some of the roadside trails and walkways.

Subarea 12 General Description: Look over Batiquitos Lagoon from the hills around Denk Peak and the Mahr Reservoir or look into the dramatic Box Canyon area. These dynamic views are worth the walk.

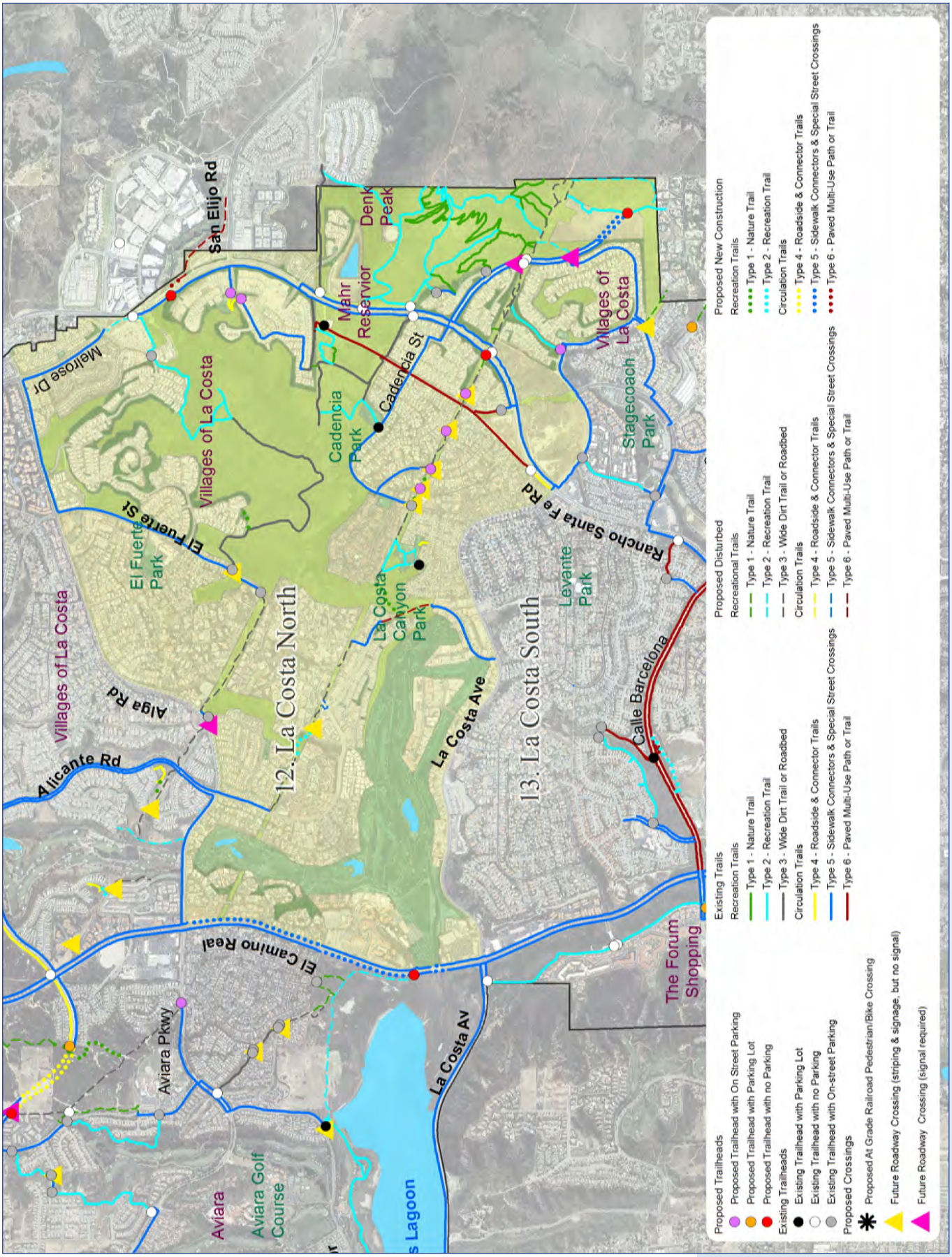
Destinations: Mahr Reservoir, Denk Peak and La Costa Golf Course and Spa.

Range of Difficulties: Moderately steep trails leading up to Denk Peak and around Box Canyon.

Range of Surface Types: Most of the trails are compacted native soil, but because of the steepness, are only usable by mountain Bikes or by foot.

Possible Loops: Several loops exist as part of the La Costa Preserve area. If the two utility corridors are improved, then these corridors can be used as a loop system. The upper Box Canyon trails can be used to loop back on itself if some of the roadside walkways are combined.

Figure 6.14: Subarea 12 Map



Subarea 13: La Costa South

La Costa South includes several older developments scattered among rolling hills with some canyons, ponds and other open spaces. The open space percent of total acres is lower than most subareas, except for the hills located to the west of El Camino Real, which contain significant open space resources (see "Figure 6.15: Subarea 13 Map").

General Recommendations

This subarea contains many trails even though the open space is limited. Since there are limited open space areas accessible from trails, expanded trail development is also limited. Connections to trails found in Encinitas known as the Ranch could be increased, but private property owners in this area may be reluctant to allow new connections through or next to their property.

Subarea 13 General Description: Whether along creeks, through open space canyons or along open water bodies, this subarea has some of the older trail systems with mature vegetation and adjacent riparian areas or planted slopes.

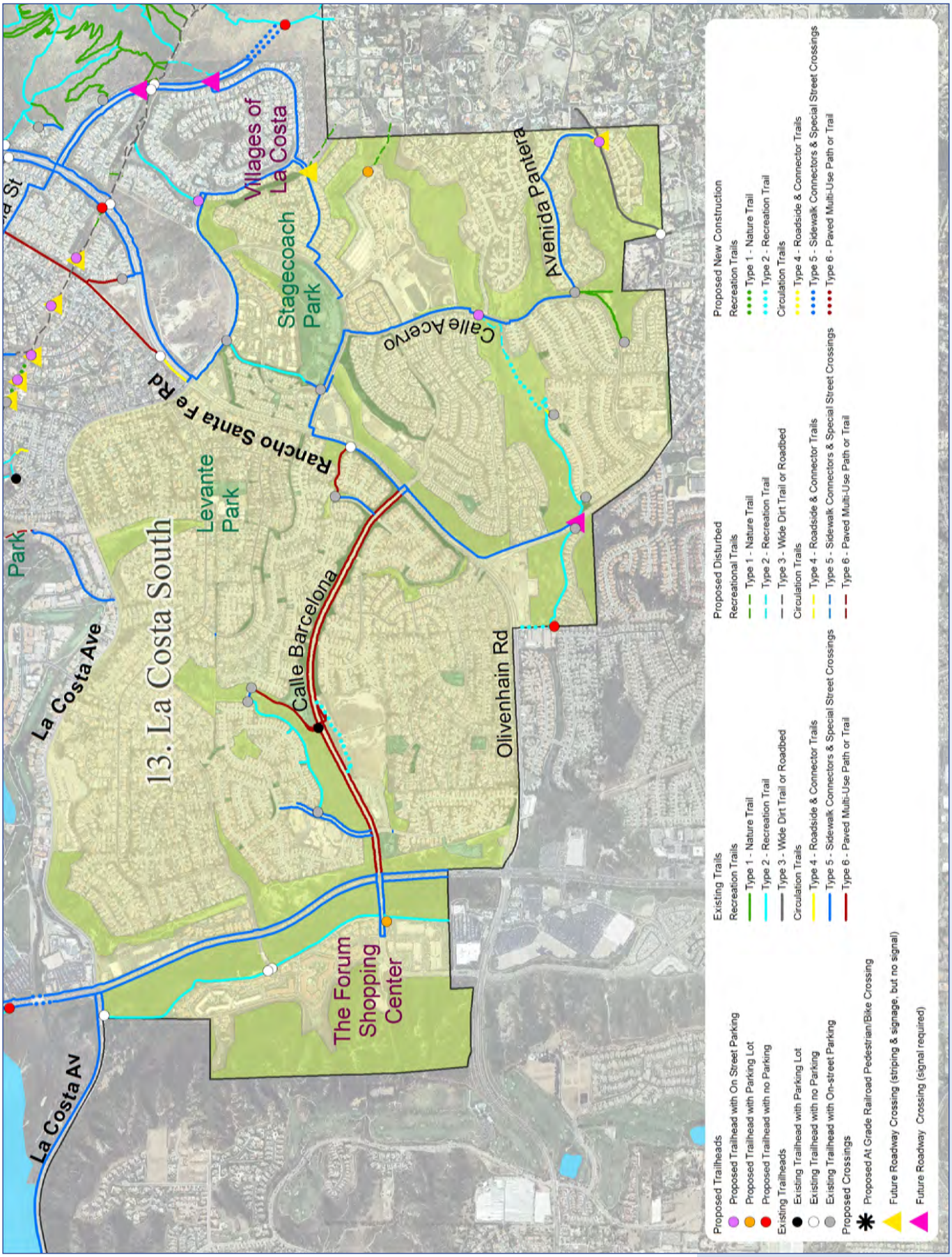
Destinations: The Forum Shopping Center, schools, several water bodies and a few wide open canyons.

Range of Difficulties: Most trails in this area are flat.

Range of Surface Types: Most trails in this area have compacted decomposed granite surfaces that can work for most users except for bikes with narrow high pressure tires.

Possible Loops: Loop opportunities for new trails are limited to using various streets as connectors. The Type 4 trails can help connect the open space trails, especially those along Calle Barcelona. Other loops are more difficult to connect since they do not have parallel trail segments.

Figure 6.15: Subarea 13 Map



6.9 Special Trail Designations

The following discussion is centered on trails with special designations or purposes.

Coastal Rail Trail

Many alternatives have been discussed regarding the preferred route for the Coastal Rail Trail. The routes north of the north end of the existing segment are fixed, but the southern route can include variations through the Encina Power Station Plant. It will need to be determined whether or not the trail is best on the east or west side of the tracks (see "Figure 6.16: Proposed Coastal Rail Trail Future Alignments"). Also, south of the Poinsettia Coaster Station, it is possible to follow the rail line for a longer period of time until joining back with Avenida Encinas.

Caltrans North Coast Bike Trail

As part of the Caltrans led I-5 North Coast Corridor Public Works Plan, the North Coast Bike Trail will provide alignments of new bike facilities, primarily in or near the I-5 right-of-way (see "Figure 6.17: Proposed Caltrans North Coast Bike Trail"). The north end of the trail will correspond with the Coastal Rail Trail.

Carlsbad Boulevard Realignment Coast Bluff Trail

This project proposes to shift the roadway to the east, thereby creating surplus right-of-way and pavement located west of Carlsbad Boulevard (see "Figure 6.18: Proposed Carlsbad Boulevard Realignment- Coastal Bluff Trail"). This plan suggests that the trail be named the Coastal Bluff Trail.

California Coast Trail

The California Coastal Conservancy is championing a network of roads, walkways, trails and beaches as a 1,200 mile long mapped route for hikers, runners and cyclists. The segment that comes through Carlsbad is not well defined, but it is likely to follow parts of the Coastal Rail Trail across Buena Vista Lagoon and then follow a series of streets through Carlsbad Village and potentially use the proposed Coast Bluff trail (see "Figure 6.19: Proposed California Coast Trail").

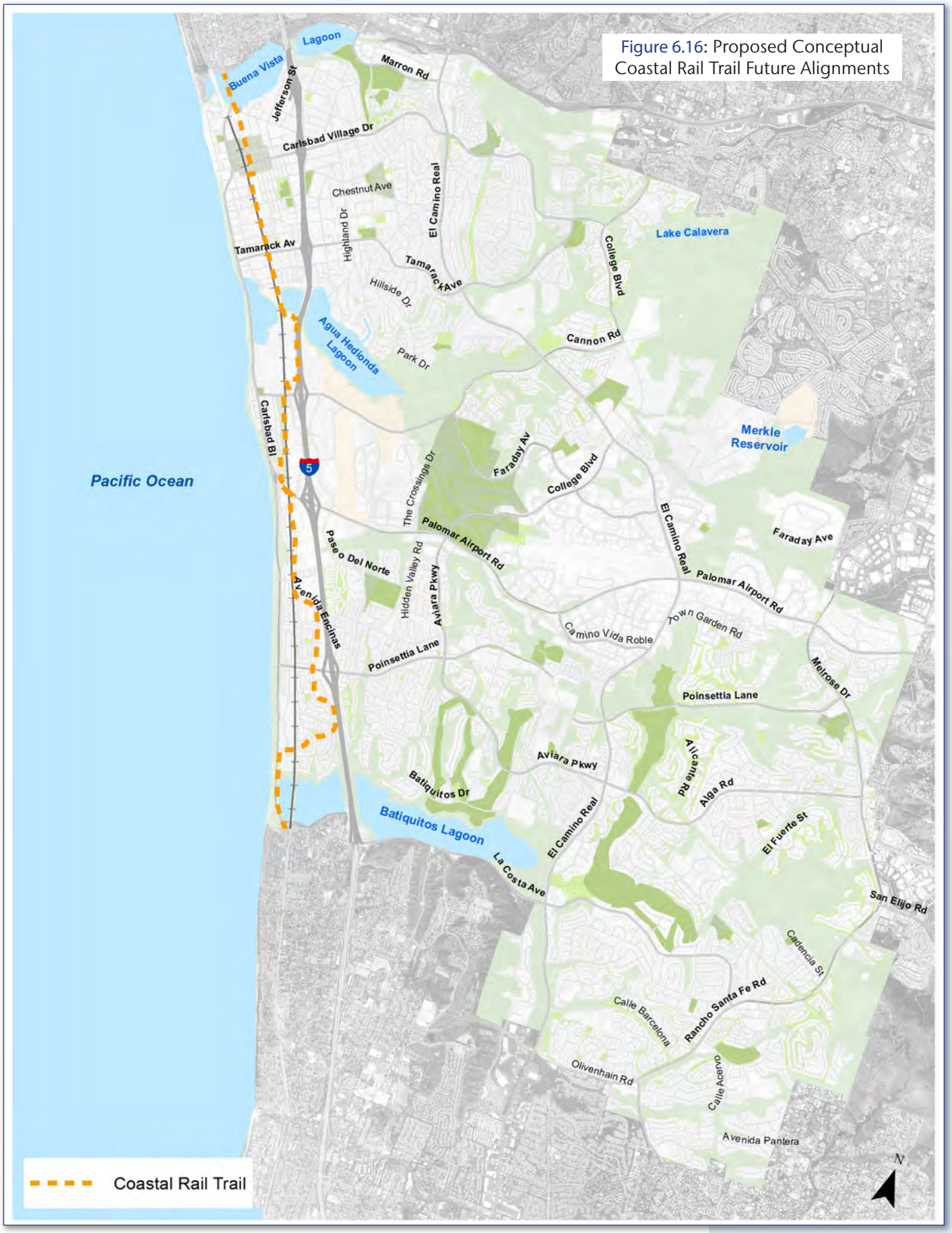


Figure 6.16: Proposed Conceptual Coastal Rail Trail Future Alignments

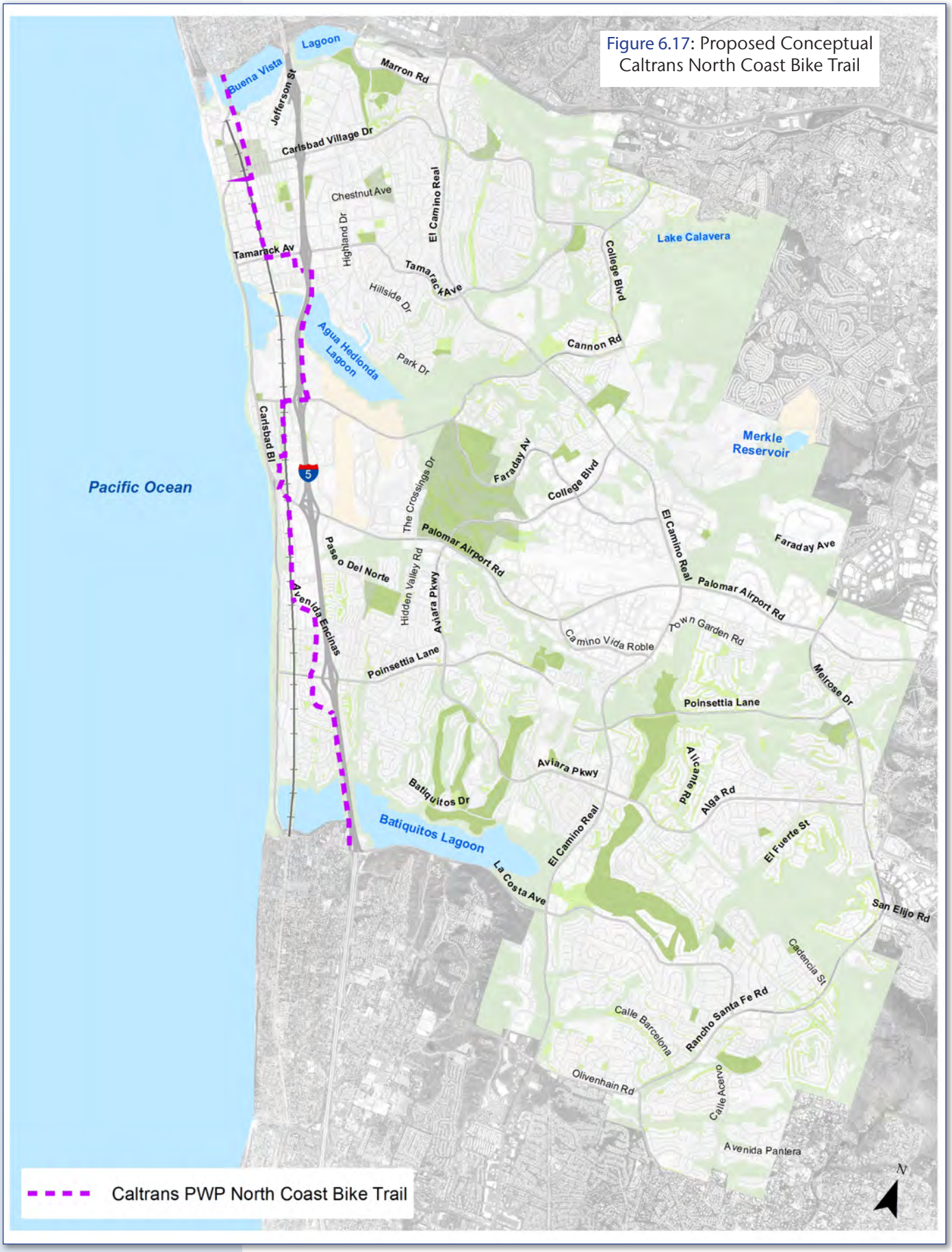


Figure 6.17: Proposed Conceptual Caltrans North Coast Bike Trail

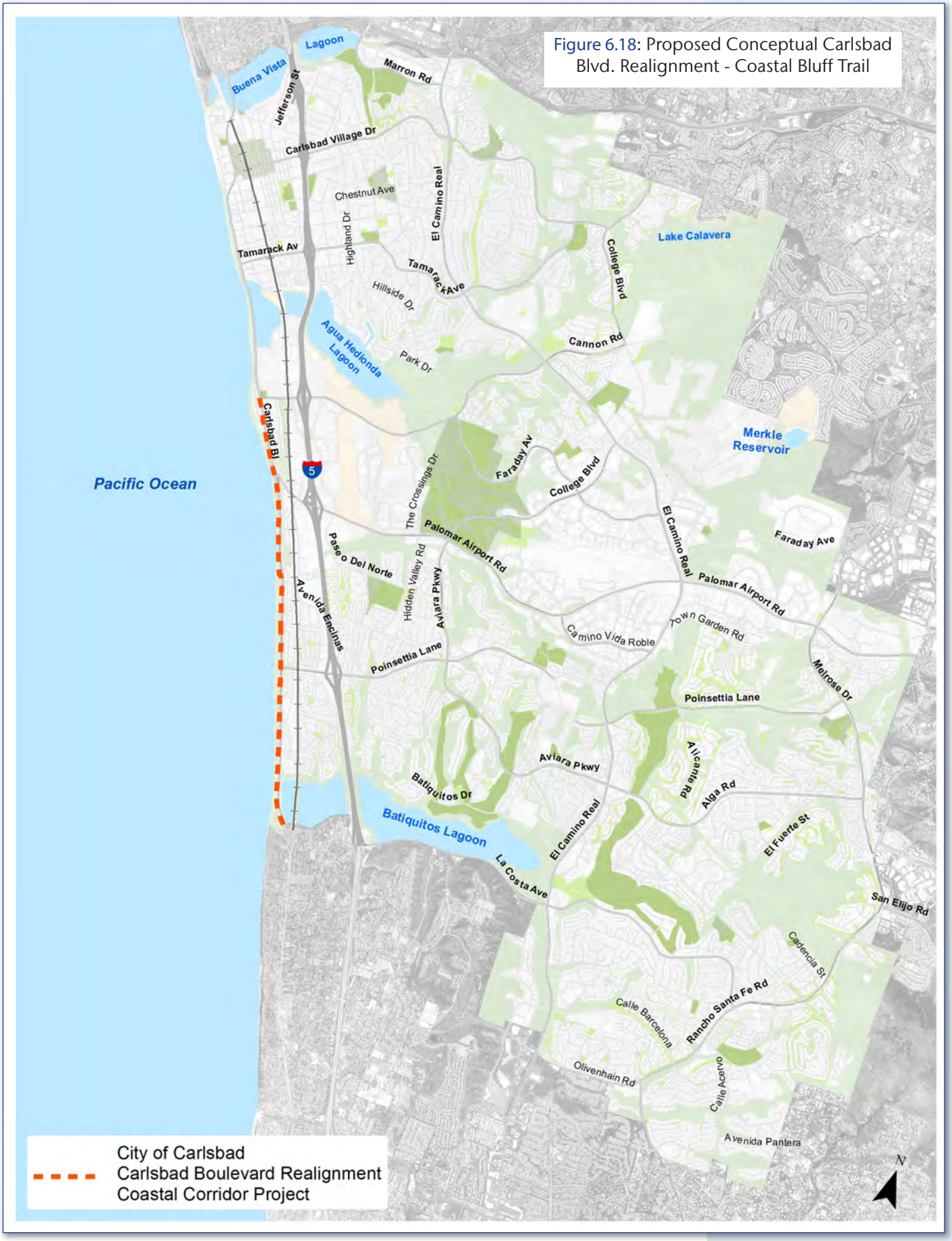


Figure 6.18: Proposed Conceptual Carlsbad Blvd. Realignment - Coastal Bluff Trail

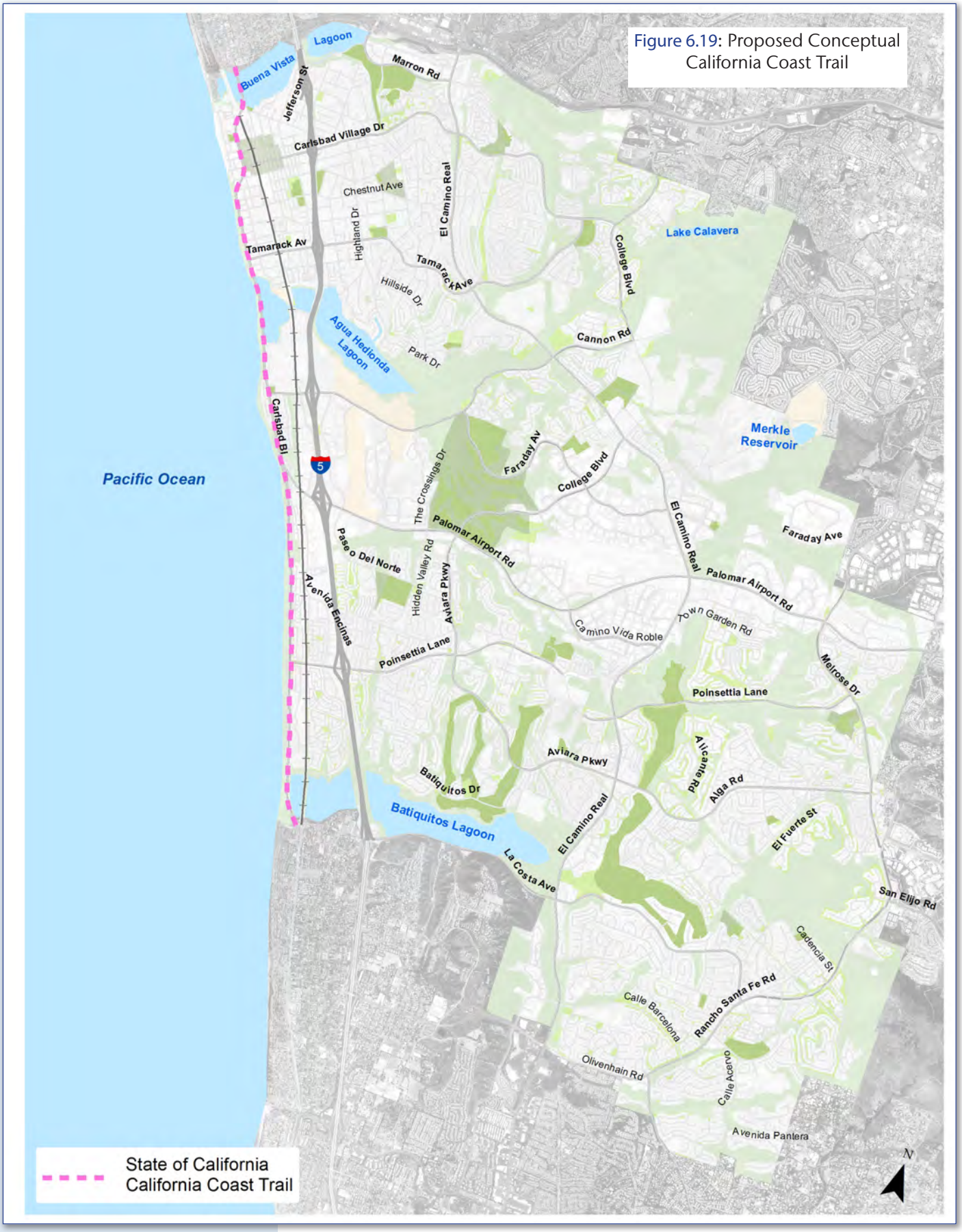


Figure 6.19: Proposed Conceptual California Coast Trail

Chapter 7

Trail Standards

7 Trail Standards

This chapter summarizes guidelines and standards for pedestrian and bicycle multi-use paths that may be part of the City of Carlsbad trail network. These design standards and guidelines have been incorporated into the alignments in Chapter 6, Trail Recommendations. Federal, state or local environmental regulations may apply to trails and other associated development. Responsible trail system design generally strives to limit impacts, but trails are also often sited in sensitive areas. The application of design standards and guidelines, coupled with impact avoidance and protective measures, must be made to offset potential impacts.

7.1 Overall Design Objectives

The city's objective is to design, construct, and maintain trails that:

- Provide safe non-motorized transportation links and/or close-to-home recreation opportunities;
- provide legal public access to destination points and other areas of interest;
- blend with the surrounding environment and minimize impacts on the natural environment;
- minimize impacts on adjacent landowners; and
- require minimum levels of maintenance.

7.2 Design Considerations

1. Human Factors

Trails must be planned and constructed with the needs of the trail user in mind. Trail users favor routes that connect areas of significant community activity, such as schools, businesses, shopping areas and parks, as well as other areas of interest such as viewpoints, water, natural areas, scenic corridors, and interesting geologic features. Visual qualities are important to them as well; therefore, trails should be designed to blend with the surrounding environment and to provide vistas. Human behavior should be considered as well. For example, many trail users favor routes that loop back to the trailhead instead of an out and back experience. This relates to the desire of many trail users to experience new views and conditions that are afforded by looped trails. This desire is often to blame for new unauthorized trails being created by "off-trail" uses. When possible, looped trails should be considered where possible.

2. Coinciding Easements

Trails are frequently located within common tracts and easements dedicated for other purposes such as drainage, flood control, public utilities, natural open space, and scenic corridors. In situations where these easements are wider than needed for primary access for maintenance, it may be advantageous to dedicate the same area for the purposes of public trail use. This will increase the flexibility to properly lay out, design, and construct public trails, and will allow the trail to be positioned away from undesirable areas such as low-flow wash channels, areas of extreme topography, dense vegetation, critical habitats and adjacent properties. This will also allow future realignment of the trail, should such a realignment become necessary.

3. Adjacent Landowner Privacy

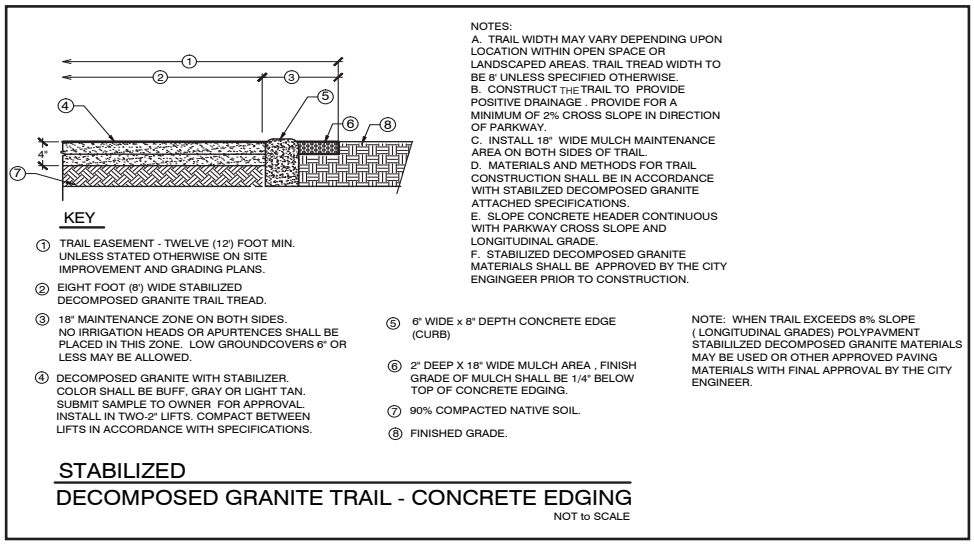
The privacy of landowners adjacent to trails and trail access facilities is an important design consideration. Privacy can be maintained or improved by modifying the trail alignment, planting landscape buffers, installing walls, fencing, creating grade separations, or using a combination of these methods.

4. Trail Viewshed

The line of sight from a trail to the surrounding landscape, and from the surrounding landscape to a trail, are important design factors. Views from the trail to the surrounding landscape improve the quality of the trail users' experience; therefore, trails should be designed to provide varying views of the surrounding area. Obscuring views of the trail from the surrounding property is important to adjacent landowners who may not want to view the trail from their property.

5. Circulation/Mobility Element Trails

The design, construction and maintenance of trails within the City of Carlsbad will take into account the City of Carlsbad Landscape Manual Guidelines when Circulation Element trails are constructed within or near public street right-of-ways. A two-foot maintenance zone adjacent to the trail shall not include utility or irrigation valve boxes, or electrical boxes. See the construction detail for Circulation Element Trails.



Sample detail for roadside trail (Type 4) - assuming a firm surface of compacted DG

6. Sensitive Wildlife Habitat

Trail design and construction within coastal sage open space areas should be evaluated in terms of the effect that the trail will have on sensitive wildlife habitats. Pertinent resource agencies such as the California Department of Fish and Wildlife, United States Fish and Wildlife Service and California Coastal Commission (in coastal zones) should be consulted during the master planning process or during the trail design process for all projects that have coastal wetlands trail segments to assure that the trail will not have a negative impact on such resources. Seasonal trail closures may be necessary in some situations and the Habitat Management Plan Open Space Management Agreement shall also be taken into consideration for future trail alignments and construction.

7. Archaeological and Cultural Resources

Trail design and construction should be evaluated in terms of the effect the trail will have on archaeological or cultural resources. Trail construction must be done in accordance with local archaeological ordinances. Potential options to prevent and mitigate damage to these resources include:

- Altering the trail alignment to avoid archaeological and cultural resources;
- protecting the resources by utilizing methods to obscure them from view;
- mitigating the cultural resource, which involves removal and thorough documentation of the items by a professional archaeologist; and
- the documentation of the resource may be interpreted as part of the trail opportunity.

8. Design for Shared-Use

Trails within the City of Carlsbad are typically open to all non-motorized uses unless otherwise stated. Bicycle use on the Batiquitos Lagoon North Shore Trail is prohibited however, and resource agencies may also require restricted uses on some trails in the city. Decisions to prohibit any non-motorized use from City of Carlsbad trails must be based on coordinated planning efforts involving appropriate user groups and city staff.

The following means of preventing potential user conflicts are based on methods identified in "Conflict of Multiple Use Trails" (Moore, 1994), and should be considered when planning, designing, constructing and maintaining shared-use trails:

- Separate user types at trailheads and along the first, most crowded, stretches of trail;
- provide adequate sight distances;
- build and maintain trails wide enough for safe passing, and/or provide periodic turnouts;
- design trails to control speeds where necessary by varying the trail surface and avoiding long, straight downhill stretches;
- provide adequate trailhead facilities for all user types; and
- provide signage indicating trail uses allowed for a particular trail.

7.3 State and Federal Trail Standards

California Department of Transportation
California Manual of Uniform Traffic Control Devices (CA MUTCD)

Although the recreational trails (Type 1, 2 and 3) are outside of roadway right of ways, the circulation trails (Type 4, 5 and 6) are commonly in or next to public rights of way with vehicular traffic. In these cases, the ***California MUTCD*** is considered to be the guiding document published by the State of California, Department of Transportation ***(Caltrans)***. The intent of the document is to adopt uniform standards and specifications for official traffic control devices in California. Traffic control devices are defined as all signs, signals, markings and other devices used to regulate, warn or guide traffic, placed on, over or adjacent to a street, highway, pedestrian facility or bikeway by authority of a public agency or official having jurisdiction, or, in the case of a private road, by authority of the private owner or private official having jurisdiction. The CA MUTCD is not applicable to privately owned and maintained roads or commercial establishments in California, unless the particular city or county enacts an ordinance or resolution to this effect.

The CA MUTCD 2012 edition incorporates the ***Federal Highway Administration's (FHWA) MUTCD (2009 Edition)*** and includes all policies on traffic control devices issued by Caltrans since 2010 and other editorial, errata and format changes that were necessary to update the previous documents. The CA MUTCD does not supersede Caltrans' Standard Plans, Standard Specifications or its Special Provisions publications, but all CA MUTCD standard statements must be met.

California Department of Transportation Highway Design Manual (HDM)
The ***Highway Design Manual*** is used by Caltrans staff and non-Caltrans project managers and planners for project designs within the Caltrans right-of-way and elsewhere. The design standards cover a wide array of focus areas including drainage, pavement and basic design policies. ***HDM Chapter 1000*** specifically addresses bikeway planning and design and defines three bikeway types that coincide with Carlsbad's trail types as described in the following sections. Any trail designated to encroach into or travel within the Caltrans right-of-way must be designed per HDM Chapter 1000, as well as any on-street bicycle facility. However, because HDM Chapter 1000 is essentially the state standard for bicycle facilities, even facilities outside the Caltrans right-of-way should be built to HDM Chapter 1000 criteria to maintain eligibility for federal funding, which is administered in California by Caltrans. The entire document is available online at: ***www.dot.ca.gov/hq/oppd/hdm/hdmtoc.htm.***

Additional references include:

- NPS Trails Management Handbook, U.S.D.I. National Park Service, 1983.
- Trail Construction / Maintenance Notebook, U.S.D.A. Forest Service, 1996.
- Trails for the 21st Century, Rails to Trails Conservancy, 1993.

7.4 Guidelines for Trail Layout and Location

Necessary steps to properly layout a trail are consistent for most all trails. The following sections cover the steps needed for a successful trail layout and construction.

Reconnaissance

Application of sound principles of trail location, alignment and grade will minimize future operation and maintenance problems. The first step is to examine the most recent topographic maps and aerial photos of the area to identify significant landforms, drainage patterns and vegetation. The next step, for which there is no substitute, is to walk the area and examine potential routes. Conduct a systematic study of the area by walking various routes and viewing the area from different vantage points. Control points, which are features that are favorable for or inhibit trail construction, should be identified through this process. The control points will help to identify the best possible route, with the understanding that situations may exist where trails must pass through negative control points. Control points which are favorable for trail construction are:

- Road crossings such as underpasses, overpasses and intersections with traffic signals or stop signs;
- natural wash crossings;
- ridgelines;
- hillside benches;
- areas of light vegetation;
- scenic vistas;
- areas of well drained soils; and
- areas with good trailhead access.

Control points, which will inhibit trail construction and should be avoided are:

- Wet areas and poorly drained flat areas;
- sensitive wildlife habitats;
- wash bottoms;
- areas adjacent to sources of excessive noise, such as airports;
- areas adjacent to plants that are poisonous to horses, such as oleanders;
- steep rock slopes;
- unstable or fragile soils;
- abrupt elevation changes;
- bluffs, ledges and cliffs except where featured as scenic resources;
- frequent wash crossings;
- locations requiring bridges or culverts;
- areas of heavy or fragile vegetation;
- areas requiring switchbacks;
- areas of archaeological/cultural sensitivity;
- unsafe or uncontrolled road crossings; and
- knows habitats of threatened or endangered plant or animal species.

Grade

The degree to which a trail rises or falls over a linear distance is an important factor in determining the length of the trail, level of difficulty, appropriate user types, and drainage and maintenance requirements. Occasional fluctuations in the trail grade should be considered to provide variation for trail users and to facilitate proper drainage. Frequent or drastic changes in grade should be avoided. The grade line between control points can be plotted on paper to determine if switchbacks or other special features will be needed to sustain a certain grade. On moderate to steep side slopes, a periodic reverse in the grade should be included to create dips for drainage purposes. When grade dips are included in the initial trail construction, the need for waterbars is eliminated.

Drainage

Proper drainage of surface water is the most important factor in the design, construction, and maintenance of trails. Surface erosion resulting from improper drainage will have a detrimental impact on the trail surface, causing damage to the natural environment and increasing maintenance requirements. The potential for erosion depends on three factors: soil type, velocity of water on the trail, and the distance water travels down the trail. Alteration of any of these factors can reduce the potential for erosion. Proper outsloping of the trail tread and the installation of grade dips or waterbars will help decrease the potential for erosion of the trail surface. If distances allow, grade dips are preferred over waterbars. Existing drainage patterns of the surrounding area, such as concentrated drainage channels, must be maintained. Attempts to alter the existing drainage patterns will have a negative effect on the natural environment, and will most likely result in severe damage to the trail.

7.5 Accessibility Requirements

Federal and State of California laws and regulations require that all public facilities be made accessible to people of all ages and abilities. The concept of universal access takes this requirement a bit further and suggests that making all public facilities easier to access benefits all members of society, even those without formal disabilities, including the aged and youth with underdeveloped motor skills. On the other hand, certain types of activities in certain types of unimproved areas are not expected to be made fully accessible if meeting the minimum requirements would be considered damaging to the natural, historical or cultural environment. The primary requirement for accessibility includes grade of the slope and cross slope of the trail and the trail surfaces.

It is the intent of this Master Plan is to designate Trail Type 2 (recreation trail), Type 4 (roadside trail or connector trail) , Type 5 (sidewalk connector and special street crossings) and Type 6 (class 1 multi-use path) as accessible facilities. Trail Type 1 (nature trail) and Trail Type 3 (dirt roadbed) are commonly sited in areas where a 5% or 8.33% trail slope is not obtainable. To meet this standard, major grading and switchbacks would be needed, making a trail like this damaging to vegetation, habitats, landform, cultural resources and other features. Cross slopes of less than 2% are not obtainable on these trail types due to drainage requirements. Finally, the preferred surface treatments for Trail Type 1 and 3 do not support assisted-walking devices or wheelchairs.

ADA regulations require for compliance on portions of a trail where damage to the natural, historical or cultural requirements would not occur. These regulations also allow for the provision of a similar experience on similar trails, without making all trails fully accessible. Since Trail Type 2, 4, 5 and 6 would be accessible, then the City of Carlsbad will have made reasonable and positive steps to provide access to similar trail experiences throughout the city, reserving those facilities that are through natural, steep terrain, as not accessible in order to avoid damage to the trails resources.

Making a trail accessible to people with disabilities involves more than just the trail itself. It also requires that an accessible pathway leads to the trailhead or that the trailhead access point is fully accessible, including the parking lot. Access points along the trail should also be accessible to people with disabilities. The facilities around the trail should be designed for access. For example:

- Trailhead and destination areas with parking and restrooms should conform to ADAAG requirements for accessible parking and restrooms.
- Elements such as picnic areas should be connected with a pathway that meets the accessible design recommendations for accessible trails.
- Signage at access points should conform to ADAAG requirements for font size, font type and contrast.
- While pathways connecting with accessible trails should provide the same accessibility standard of the trail itself, tread width may be adjusted based on expected use levels.

7.6 Trail Surface Standards

Samples of trail surface options are shown on "Table 7.1: Trail Surfaces Samples". Trail width and grade standards are shown on "Table 7.2: Standards for Trail Types". Surface types recommended for different trail types are shown on "Table 7.3: Recommended Surfaces and Edge Treatments".

Advancements in new paving types are on-going. Performance is the most important selection criteria for selecting pavement types. The critical performance criteria are based on the movement of wheeled bikes, strollers and wheel chairs, as well as price, longevity and aesthetics. For transportation funded projects or those taking credit for bike related active transportation, a hybrid commute bike should be considered the minimum standard for accommodating. These bikes have slightly wider tires and lower pressure (60-100 pounds per square inch) than a comparable high performance road bikes (100-160 psi) used by more advanced competitive and serious cyclists. A cyclist with a very light and expensive bike is not likely to ride on any surface other than asphalt or concrete, partially due to stability of the bike, drag on the wheels and possible dirt, sand and paint chipping resulting from high pressure tires that often shoot up small particles of rock.

A hybrid commute bike with thinner tires is considered to be the minimum requirement to determine if the trail is usable as a transportation asset. This type of bike can handle firm surface compacted trails but cannot handle the soft surfaces that a wide, medium pressure tire of a mountain bike can handle.

General Surface Classifications

- ***Soft surface trails*** consist of local native soils with some additional material often added to improve compaction, traction and erosion resistance. Trail surfaces can be loose packed sand (a), gravel or uncompacted decomposed granite (b), or native soil (c).
- ***Firm surface trails*** include all firm surfaces such as compacted crushed stone (d) and compacted, emulsified or cemented particles of decomposed granite (e).
- ***Hard surface trails*** include asphalt or colored asphalt (f), concrete or colored concrete (g) and permeable concrete or permeable asphalt (h).

No expectation for ADA access or use by high pressure-narrow profile tires should be implied for Trail Types 1 or 3. A Type 2 trail, on the other hand, should be a firm surface which requires either heavily compacted native soil (with only a small percentage of sand or clay), compacted decomposed granite, crushed compacted stone or chipped stone, stabilized decomposed granite (stabilizers or emulsifiers are additives that bind the soil particles of decomposed granite), or a cement added to the soil mix. In general, if an asphalt or concrete surface is used, it would be considered a hard surface paved trail and should be classified as a Type 4 roadside trail, a Type 5 sidewalk connector or a Type 6 paved multi-use trail.

Paved trails (some type 4's and all type 5's and 6's) will typically be asphalt, but may be concrete where warranted. New surfaces of highly compacted and emulsified decomposed granite can be used, or varieties of colored asphalt, colored concrete or permeable asphalt or permeable concrete can be considered. Although much more expensive than standard asphalt or concrete, these enhanced pavement types are useful for their aesthetic appeal, long wear patterns and ability to infiltrate runoff (permeable surface types only).

Since bicycles are easily deflected by surface irregularities, care must be taken to maintain a smooth surface and to avoid longitudinal gaps. Striping or other surface markings must be non-skid paint, emulsified plastic or tape designed for that purpose.

A regular sweeping plan will be necessary, especially wherever a paved trail must be installed low in the topography where debris from winter storm flows may accumulate, such as dipping down to pass under a bridge. Since the trail will be inundated more often than other segments, these specific locations may be more durably constructed with concrete.

For this plan, the majority of the accessibility recommendations for Type 6 trails are based on the AASHTO "shared-use path" guidelines. However, additional issues not addressed in the AASHTO bicycle facility guide, such as protruding objects, are also included in this section addressing the similarities of Types 4 and 6 trails. Also, grade recommendations in this plan are based on those developed in the ***Regulatory Negotiation Committee for Outdoor Developed Areas*** because the maximum grades identified for cyclists in the AASHTO bicycle facility guide do not satisfactorily address the needs of some people with mobility impairments.

Surface Firmness, Stability and Slip-resistance

Surface condition is a significant factor in how easily a person with a disability can travel along a trail. Trail surface firmness, stability and slip-resistance affects all users, but are particularly important for people using mobility devices such as canes, crutches, wheelchairs, or walkers. The accessibility of the trail surface is determined by a variety of factors including:

- Surface material;
- surface firmness and stability;
- slip-resistance;
- changes in level; and
- size and design of surface openings

Surfacing material significantly affects which user groups will be capable of using them. Trails surfaced with loose aggregates are unusable by in-line skaters and many cyclists, and reduce all cyclists' speed. Paved surfaces should be provided in areas subject to flooding or drainage problems, in areas with steep terrain, and in areas where cyclists or in-line skaters are the primary users.

Table 7.1: Trail Surfaces Samples

A. Sand | B. Native Soil | C. Gravel | D. Crushed Stone | E. Decomposed Granite | F. Asphalt | G. Concrete | H. Permeable Paving

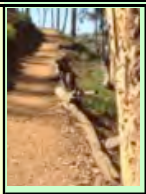
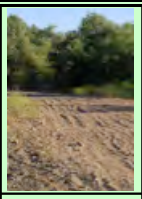
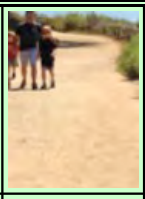
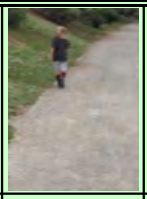
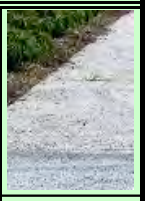
SOFT SURFACE | FIRM SURFACE | HARD SURFACE

Table 7.2: Standards for Trail Types

GUIDELINES	NOTES	TYPE 1 Primitive Open Space Nature Trail	TYPE 2 Open Space Recreation Trail	TYPE 4 Roadside or Connector Trail	TYPE 6 Multi-use Path
Tread Width	1, 1a	2' or >	4' - 8'	5'-12'	8' – 16'
Easement Width	2, 3, 6	10'-20'	10' – 20'	12'	12' – 20'
Function		Recreation	Recreation/	Recreation/ Non Motorized Transportation	Recreation/ Non Motorized Transportation
Grade	4	<25%	<8.33%	<15%	<8.33%
Cross Slope		1 – 8%	1 – 5%	1 - 2%	1 – 2%
Surface Material*	7	Suitable Native Soil	D.G. or Suitable Native Soil	D.G./Binding Agent w/concrete or wood header	Asphalt or Concrete
Anticipated User Volume		Med – Low	Medium	Medium	High
Horizontal Clearance	5	1' Beyond Tread Edge	2' Beyond Tread Edge	At Edge	2' Beyond Tread Edge
Vertical Clearance		10'	10'	12'	12'

1) Tread width within the *optimum range will be based on site-specific conditions.
   1a) When Trail shares utility access maintenance easements, or roadways, the trail width and surfacing materials shall be acceptable to all parties sharing jurisdiction of the right of way, while also providing for public safety and maintenance standards. San Diego Regional Standards shall take precedence over these design guidelines where trails are shared in utility access or maintenance areas where the Regional Standards are called out.
2) Easement width within the *optimum range will be dependant on topographical or environmental conditions, i.e. steep slope, rugged terrain, rock outcroppings, or sensitive biological resources or habitat which require the maximum easement width.
3) These are *optimum grade ranges. The following additional criteria can be applied to Type 1 and 2 trails if warranted by site conditions.
   - Ideal: 0% - 5%
   - Acceptable: Average running grade of 10% or less, for distances over 200 feet
   - Acceptable: Average running grade of 15% or less, for distances under 200 feet
   - Acceptable: Average running grade of 20% or less, for distances under 100 feet
   - Sufficient switchbacks should be provided to avoid excessive grades
   - Type 1 trails may exceed 20% grade due to existing conditions or environmental constraints but for running grades of only brief distances.
4) Type 2 trails at 4 feet shall provide horizontal clearance 1 foot beyond tread edge to a minimum height of 3 feet.
5) Circulation Element type 4 and type 6 trails are associated with the road right-of-way. The minimum width specified corresponds to the current standard for high use, multi recreational use. Depending on the discretionary project being contemplated, an additional 5 feet of road right-of-way may be required, thus providing a total width of 15 feet for trail / parkway purposes.
6) Optimal pathways have separation from the roadway, but implementation is often limited due to road right-of-way widths, topographic conditions, and increased construction cost.
7) All decomposed granite materials shall have a stabilizing agent incorporated and blended at the batch plant or quarry. Approved types include but are not limited to: (grades over 8%) Polypave, Color shall be gold or tan and a submittal sample shall be provided to the Project Engineer for approval through the typical submittal process.

Table 7.3: Recommended Surfaces Treatments

TRAIL OR ROUTE TYPE #	Name	Surface (Tread) Type							
									
	Trail Type Name	SOFT SURFACE: Uncompacted native soil	SOFT SURFACE: Crushed rock, sand or gravel	SOFT SURFACE: Uncompacted decomposed granite (DG)	FIRM SURFACE: Highly compacted chipped stone	FIRM SURFACE: Heavily compacted or emulsified DG	HARD SURFACE: Standard or colored asphalt	HARD SURFACE: Standard or colored concrete	HARD SURFACE: Permeable concrete or asphalt
NATURAL TRAIL TYPES (SOFT OR FIRM SURFACE TRAILS IN OPEN SPACE)									
1	***Nature Trail***	✔	✔	✔					
2	***Recreational Trail***				✔	✔			
3	***Wide Dirt Trail or Utility Roadbed***	✔	✔	✔	✔	✔			
ACTIVE TRANSPORTATION / RECREATION TRAILS (FIRM OR HARD SURFACE MOSTLY NEAR ROADS)									
4	***Roadside or Connector Trails***				✔	✔	✔	✔	✔
5	***Connector Sidewalks or Special Street Crossings***						✔	✔	✔
6	***Paved Multi-use Trail (Class: all Non-motorized Users)***						✔	✔	✔

Firmness is how a surface resists deformation by indentation when a person walks or wheels across it. A firm surface does not compress significantly under the forces of trail use.

Stability is the degree a surface remains unchanged by contaminants or applied force so that when the contaminant or force is removed, the surface returns to its original condition. A stable surface is one not significantly altered by a person walking or maneuvering a wheelchair on it.

Slip-resistance is based on the frictional force necessary to permit a person to move across a surface without slipping. A slip-resistant surface does not allow a shoe, wheelchair tires, or a crutch tip to slip when crossing the surface. Types 4, 5 and 6 trails should have a firm and stable surface because when a person walks or wheels across a surface that is not firm and stable, energy that would otherwise cause forward motion instead deforms or displaces the surface or is lost through slipping.

Asphalt and concrete are firm and stable. Under dry conditions, most asphalt and concrete is also fairly slip-resistant. Other trail materials, such as compacted crushed stone or decomposed granite, are also firm and stable under most conditions, but are sometimes too loose to be ADA-compliant. The addition of bonding agents or emulsifiers can address this issue and will improve longevity. Type 4, 5 and 6 trails should be designed to be slip-resistant during wet weather conditions. U.S. Access Board Technical Bulletin #4 addresses slip-resistance for more detail.

Paving Patterns

Hardscape surface design qualities can be used to reinforce Carlsbad trail branding. There are a wide variety of options to choose from in terms of style and materials. Concepts to consider include a consistent use of materials, finishes, color, stamping or score patterns. Selections should be based on the desired trail theme and cost. Also, it is likely that the level of design would be higher at nodes such as trailheads.

Abrupt Level Changes

Changes in level are defined as the maximum vertical change between two adjacent surfaces. Problematic examples that may occur along Types 4 and 6 trails include uneven transitions between trail bridge surface or walkways, or cracks or change in natural ground level (often caused by seismic activity or tree roots). Although abrupt level changes are not desirable for people with mobility impairments, they are potentially even more of an issue for cyclists and in-line skaters and can also cause pedestrians to trip and fall. The risk is particularly acute for those who have difficulty lifting their feet off the ground or who have limited vision and may be unable to detect the level change. Catching a wheel on an obstacle or level change can easily tip wheeled devices as the individual's momentum continues forward despite the wheels having suddenly stopped. Minimizing or eliminating abrupt level changes will greatly improve Type 6 trail safety for all users.

For Types 4, 5 and 6 trails, the following recommendations should be followed:

- Vertical level changes should not be incorporated in new construction;
- if unavoidable, small level changes up to a quarter inch may remain vertical without edge treatment;
- a beveled surface with a maximum slope of 50 percent should be added to small level changes; and
- level changes, such as curbs exceeding one-half inch, should be ramped or removed.

Trail Drainage Structures

Trail drainage openings are spaces or holes in the paved trail surface. On recreation trails, openings may occur naturally, such as a crack in a rock surface. However, on Type 4 and 6 trails, openings are usually constructed, such as spaces between the boardwalk planks to allow water to drain from the surface. A catch basin or trench drain grate is an example of a drainage structure with openings that allow water to drain into a conveyance system, typically a framework of latticed or parallel bars that prevents large obstacles from falling through a drainage inlet but permits water and some sediment to pass through.

Openings, such as drainage grates, should be located outside the trail tread. Wheelchair casters or walkers, crutch and cane tips, in-line skate wheels and narrow bicycle tires can get caught in poorly placed grates or gaps, creating a serious safety hazard. If placing openings in the trail cannot be avoided, employ the following specifications:

- Width - The size of the open space should not permit a 1 1/2" diameter sphere to pass through the opening. If a wider gap is unavoidable because of existing design constraints, it may be acceptable to extend the width to a maximum of three-quarters inch.
- Orientation - If the open space is elongated, it must be oriented so that the long dimension is perpendicular to the trail.

Grade and Cross Slope

People with mobility impairments find negotiating steep grades difficult because of the additional effort required to travel over sloped surfaces. Manual wheelchair users may travel rapidly downhill, but will be significantly slower uphill because more energy is required to traverse sloped surfaces than level surfaces. Powered wheelchairs use more battery power on steep grades because they must compensate for the difficult terrain. Also, both powered and manual wheelchairs are less stable on sloped surfaces, particularly if wet. Steep running grades are particularly difficult for users with mobility impairments when resting opportunities are not provided, but even less severe grades that extend over longer distances may tire users as much as shorter, steeper grades. In general, running grades on Type 2, 4 and 6 trails should not exceed five percent and the most gradual slope possible should be used. If steeper segments are incorporated into the shared-use trail, the total running grade exceeding 8.33 percent should be less than 30 percent of the total trail length. In general, the lengths of the steep sections should be minimized and kept free of other access barriers.

Because negotiating a steep grade requires considerable effort, users should not be required to exert additional energy to simultaneously deal with other factors, such as steep cross slopes and vertical level changes. Note that although the recommended maximum grades are similar to those recommended in the 1999 ***AASHTO Guide for the Development of Bicycle Facilities***, the maximum distances are significantly shorter. When designing trails where maximum grades must be met, the following recommendations should be used:

- 8.3 percent for a maximum of 200 feet;
- 10 percent for a maximum of 30 feet; and
- 12.5 percent for a maximum of 10 feet

Near the top and bottom of the maximum grade segments, the grade should gradually transition to less than five percent. In addition, rest intervals should be provided within 25 feet of the top and bottom of a maximum grade segment. Rest intervals may be located on the trail, but should ideally be located adjacent to the path for the safety of all users. Well-designed rest intervals should have the following characteristics:

- Grade not exceeding five percent;
- cross slopes on paved surfaces not exceeding two percent and cross slopes on non-paved surfaces not exceeding five percent;
- firm and stable surface;
- width equal to or greater than the width of the path segment leading to and from the rest interval;
- minimum length of 60 inches; and
- minimize change of grade and cross slope on the segment connecting the rest interval with the trail.

Cross Slope and Drainage

Severe cross slopes can make it difficult for wheelchair users and others to maintain lateral balance because they must constantly work against the force of gravity pulling them sideways, causing them to veer downhill. The impacts of cross slopes are compounded when combined with steep grades or unstable surfaces. Cross slope can be a barrier to people with mobility impairments, but some cross slope is necessary to drain water quickly off of trails. The negative effect cross slopes have on pedestrian mobility must be balanced against the necessity of including cross slopes to provide adequate drainage. The minimum cross slope necessary should be used for Types 4, 5 and 6 trails. For asphalt and concrete, a cross slope of two percent should be adequate. For non-paved Trail Types 1, 2 and 3 with surfaces such as crushed aggregate or native soil, the maximum recommended cross slope is five percent.

Protruding Objects

Examples of protruding objects include light posts, poorly maintained vegetation and signs. Visually impaired users who use guide dogs for navigation need clearance to avoid pathway obstacles up to 80 inches high. Objects that protrude into a trail, but are higher than 80 inches, tend to go unnoticed because most pedestrians require less than 80 inches of headroom.

People with vision impairments who use long white canes to navigate can easily detect objects on trails below 27 inches. However, objects that protrude into the trail between 27 inches and 80 inches are more difficult to discern because the cane will not always come in contact with the object before the pedestrian does. Ideally, objects should not protrude into any portion of the clear tread width of trails. If an object must protrude into the travel space, it should not extend more than four inches. Also, a vertical clearance of eight feet should be provided rather than the 80 inches needed for pedestrians to accommodate other trail users, such as cyclists. On shared-use trails where there is the potential for equestrian use or emergency or maintenance vehicles access, it may be necessary to increase the vertical clearance. In addition, when an underpass such as a tunnel is used, a minimum of ten feet of vertical clearance is recommended.

Rock edge definer

Log edge definer

7.7 Trail Edging and Fencing

Trail edging is designed to control the horizontal movement of trail users for safety or protection of adjacent habitats or property (see "Table 7.4: Recommended Edging and Fence Treatments"). Since the linear requirements are often long for trails, selecting the right type of edge can make a great difference in the overall costs. In some cases, the edge treatment may be an aesthetic choice, while in other cases a fence is required to prevent access into sensitive areas or private property.

Minor Edge Definers

In many cases, especially on Trail Types 1 and 2, keeping trail users on the path is important to prevent new volunteer trails or cut-throughs. Controlling directional use may be as simple as keeping existing taller vegetation in place, or by using rocks or logs to define an edge. Signage can also be placed every 100 feet or so to remind users to stay on the trail. When trying to block off a volunteer cut-through trail, piled cut vegetation and signage is often the most effective. Rock edge definers or cut log definers may be appropriate in many areas to direct movement and control access.

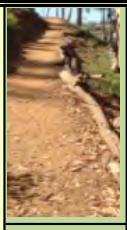
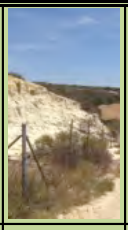
Fencing

Fencing comes in a wide array of materials and designs. Primarily the types found along trails include wire, chain link, post and rail, post and cable or welded wire segments. The purpose of fencing is to deter trail users from going off trail and to protect against access into areas with sensitive habitat or for safety.

Single strand or braided wire fence on vertical metal posts is the least intrusive of the fencing types and denotes a rural or natural containment system best used with Trail Type 1. Barbed wire or constantine razor wire is not recommended and is not allowed. An individual who wants to obtain access into an area can find a way regardless of the fencing. This treatment can pose a safety hazard and is not appropriate.

Sample details for fencing

Table 7.4: Recommended Edging and Fencing Treatments

TRAIL OR ROUTE TYPE #	Name	Edge / Fencing Treatments								
	Trail Type Name	 Shovel Cut Edge / Rock Edge / Tree Limb Edge	 Existing Vegetation Edge or New Planter Areas	 Braided Wire Fence	 Wood Post and Rope / Cable	 Peeler Log with Notched Rails	 Chain Link / Vinyl Covered Chain Link	 Metal Post and Cable	 Metal Post & Pipe Rail	 Welded Wire or Mesh Fence
NATURAL TRAIL TYPES (SOFT OR FIRM SURFACE TRAILS IN OPEN SPACE)										
1	***Nature Trail***	✔	✔	✔	✔					
2	***Recreational Trail***		✔		✔	✔	✔			
3	***Wide Dirt Trail or Utility Roadbed***	✔	✔	✔	✔		✔			
ACTIVE TRANSPORTATION / RECREATION TRAILS (FIRM OR HARD SURFACE MOSTLY NEAR ROADS)										
4	***Roadside or Connector Trails***		✔			✔	✔	✔	✔	
5	***Connector Sidewalks or Special Street Crossings***		✔							
6	***Paved Multi-use Trail (Class: all Non-motorized Users)***		✔		✔		✔	✔	✔	✔

Chain link fencing can be used along Trail Type 2 and Trail Type 6 as an appropriate edge definer. The chain link should be black vinyl coated or utilize a stain such as "Nativa" to avoid the cold gray look of galvanized metal. In most cases, a wide open chain link of one inch openings or greater is preferable, since closer spaced chain link tends to close in visually when looking down a long segment of the fence. In most cases, a 42-inch high fence is adequate to contain users and define an edge. Chain link can also be framed with wood or a metal cap to improve its overall rustic look in and around natural areas. Note that this type of fencing prevents some wildlife from traversing the trail, so if the trail is within a wildlife corridor, open railing options or wire may be more appropriate.

Welded wire fencing can be used along Trail Type 6 near the railway. NCTD has requested that a stronger fence be used to deflect any flying material or ballast that could be airborne with a fast moving train. The costs of these fence types are not warranted in general purpose locations, although they do provide vine support.

Railings

Railings provide a compromise between low edge definition and enclosed fencing. If edge protection is needed, the railing should be a minimum height of 42 inches. Railings for Type 1 trails should be used only where a drop-off occurs that needs safety protection. To control access, a variety of railing types can be used, including post and rope, peeler log with bolted rails, or peeler log with fitted rail. The post and rope, post and cable, or post and chain edge definers are recommended for Trail Type 1. The other railing based edge definers should be used on Trail Type 2 or near road Trail Type 4 or Type 6. The peeler logs seem to work best for Trail Type 2, along roadways for Trail Type 4 and for stand alone multi-use trails referred to as Trail Type 6. The post and cable or metal railing posts are more expensive, but where maintenance is an issue, such as along the coast, they may be worth the expense.

7.8 Trail Access and Trailhead Facilities

Trail system access points may be provided with various levels of amenities, depending on likely user levels and types, how users will arrive and what amenities may be desired or needed. Planned trail amenities can include design features such as bridges, rest areas and vista points, as well as intersection treatments, plant material, fencing, striping and signage. (see "Table 7.4: Amenities applied to different trail types:").

Staging Areas

Staging areas should be provided at major trail system access points. They should be sited above any potential flood flows, especially restroom facilities. Major staging areas should include all of the following:

- Shade trees (or optional shade structures);
- seating (benches;
- picnic tables;
- bicycle racks (no long-term storage);
- water for trail users;
- interpretive and directional signage;
- trash receptacles;
- off–street parking for 20 cars;
- restrooms (optional); and
- minimal security lighting (optional).

Three strand twisted wire fence

Post and cable

Peeler log, bolted

Peeler log, notched

Black vinyl covered chain link

Welded wire

Metal post and cable

Metal post and three metal rails

Traiheads

A trailhead is defined as a less developed access point to a trail system that functions as a rest area and orientation point. It is typically smaller, accommodates less people and has fewer facilities than a staging area. Trailheads may provide users the following limited features:

- Seating and/or picnic tables (not suggested if homeless and loitering are considered a problem in the area);
- trash receptacles;
- bicycle racks (no long-term storage);
- hitching posts (if equestrian use is anticipated);
- shade trees;
- interpretive and directional signs; and
- shade structures.

All Carlsbad trailheads should include trail identification signs, regulatory signs, trail user posts and a kiosk that can provide a place for maps and announcements.

Minimal level of entry elements

Restrooms

A portable toilet is an interim facility that may be provided early in a staging area's development. Portable toilets may also be brought in temporarily for special events. A permanent restroom or comfort station building is an optional facility may be provided at a later date at a staging area if demand warrants it. Maintenance costs are high as are the capital costs, so most trailheads do not warrant this facility. A major staging area may warrant the costs of a restroom facility. If a trailhead is next to a park, joint use of that facility would be logical, or a capital cost born by the trail system with maintenance costs born by the park might be a workable solution.

Moderate level of entry elements

High level of entry elements

Shade Structures

A shade structure is an open frame design feature at a staging area, trailhead or rest area. A shade structure may be provided as an option at staging areas and trailheads. However, wherever possible, shade should instead be provided by trees, especially native species. Shade structures are also valuable at the mid-points of trails or where views are available. Benches and tables should be placed under the shade structure whenever possible.

Turnouts, Vista Points and Rest Areas

The trail system may have turnouts, vista points and rest areas along its routes. The characteristics and design for each are described below.

Rest Areas

Rest areas provide an opportunity for users to move off the trail to stop and rest. Periodic rest areas are beneficial, particularly for people with mobility impairments who typically expend more effort to walk than other users. Rest areas are especially crucial when grade or cross slope demands increase. Rest area frequency should vary depending on the terrain and intended use. Popular and more difficult trails should therefore have more frequent opportunities for rest.

If a rest area is only provided on one side of the trail, it should be on the uphill side. Having separate rest areas on both sides of the trail is preferred when there is a higher volume or multi-use with cyclists that may travel at higher speeds. This reduces the trail users need to cross in front of other trail users. In general, rest areas should have the following design characteristics:

- Cross slopes on paved surfaces not exceeding two percent and cross slopes on non-paved surfaces not exceeding five percent;
- firm and stable surface;
- minimum length of ten feet and width of four feet for a standard six foot bench or seat;
- minimal change of grade and cross slope on the segment connecting the rest area with the pathway; and
- ADA accessible seating whenever any seating is provided.

Simple wood structure and table

High level shade structure and benching

High level of amenities for a viewing location

Seating can be important for people with disabilities and those who may have difficulty getting up from a seated position on the ground. Some seating should have backrests to provide support when resting and at least one armrest to provide support to help disabled users resume a standing position. Accessible seating should provide the same benefits as seating for users without disabilities. For example, providing space for a wheelchair facing away from an attractive view would not be appropriate.

Turnouts

A turnout is defined as either a widened section of trail that allows faster trail users to pass or a side path that allows slower trail users to pull over and rest away from the main trail. Turnouts should have:

- Widened pathway;
- shade trees and native vegetation;
- directional and/or mileage signs (optional); and
- fencing as needed.

Vista Points

This is a type of turnout/rest area specifically focused on scenic views. Vista points will have similar features as turnouts. If located on a bridge deck, they will be more limited with only a widened pullout and, if room is available, a bench and signage. In general, interpretive signage may be especially appropriate at viewpoints where trail users are more likely to pause.

Views entice the trail user to stop

Simple way to enhance the view experience

Views can be framed with structure placement

Rustic benches are appropriate for the Type 1 trails

Table 7.5: Amenities applied to different trail types:

TRAIL OR ROUTE TYPE #	Name	Possible Amenities																				
	Trail Type Name	Off-Street Parking	On-Street Parking	Restrooms	Major Kiosk with Info & Maps	Minor Kiosk with Maps	Trail Name & Regulatory Sign	Trail Users Post with Icons	Gateway Monument or Overhead	Overhead Shade Structures	Interpretive Facilities	Public Art	Vista Pullouts or Viewpoints	Picnic Tables	Benches	Trash Receptacle	Dog Waste Dispenser	Bike Racks	Drinking Fountain	Security Level Lighting	Pedestrian Level Trail Lighting	Non-native Shade Trees and Shrubs	Native Trees & Shrubs
NATURAL TRAIL TYPES (SOFT OR FIRM SURFACE TRAILS IN OPEN SPACE)																							
1	***Nature Trail***		✔			✔	✔	✔			✔		✔		✔	✔	✔					✔	✔
2	***Recreational Trail***	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔				✔	✔
3	***Wide Dirt Trail or Utility Roadbed***		✔			✔	✔	✔					✔			✔	✔						
ACTIVE TRANSPORTATION / RECREATION TRAILS FIRM OR HARD SURFACE TRAILS MOSTLY NEAR ROADS)																							
4	***Roadside or Connector Trails***				✔	✔	✔	✔	✔	✔		✔	✔		✔	✔	✔		✔		✔	✔	✔
5	***Connector Sidewalks or Special Street Crossings***														✔	✔	✔				✔	✔	
6	***Paved Multi-use Trail (Class: all Non-motorized Users)***	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Trail Structures

Trail structures such as retaining and seat walls, shade structures and other physical enhancements should include design features that include a consistent use of materials, forms, finishes and colors that are consistent with the Carlsbad Trail Program branding or the master planned community branding where a trail may be located within a master planned community. The Carlsbad Parks and Recreation Department reviews development plans where future trails are to be guilt and provides guidance on a case by case basis regarding special characteristics that can be included as part of the trail system they will be developed privately but have public use. Contact the Parks and Recreation Department (760 434-2826) with regard to final design and adherence to the city trail standards.

Public Art

A creative trail art program that provides beauty and learning opportunities is encouraged with the development of new trails. Local artists can be commissioned to create art for the trail system, making it unique, educational and memorable. Themes should draw from the local natural and cultural environment. Many trail art installations can function as or be incorporated into signs, benches, shelters, or even the pavement surface.

Artistic sculptural expressions, entry signage and amenity special treatments are all artistic expressions

7.9 Supporting Infrastructure

Drainage Crossing Structures

The Carlsbad trail system may require the design and construction of drainage crossing structures, and trails should be designed so that no adverse drainage impacts occur due to construction. To minimize potential impacts, trail design should give careful consideration to ponding along property lines and to prevent trail fill from blocking existing drainage patterns. Drainage structures may require review and permitting from agencies such as the California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers and the Regional Water Quality Control Board.

Culverts

A culvert is a drain or pipe that allows water to flow under the trail. Culverts are generally smaller than bridges, ranging from small pipes to large reinforced concrete structures. Culverts should be provided at appropriate intervals and should be sized to convey appropriate drainage flows. A culvert can be a cost-effective solution to bridge a minor drainage flow. Consideration should be given to design provisions such as rock edging and energy dissipaters to prevent downstream erosion in case the culvert clogs with debris and flows overtop the trail. Where culverts are employed, regular maintenance during the rainy season is recommended to clear debris.

Culverts tend to be maintenance intensive and can detract from the aesthetics of the natural environment. Culverts should only be constructed where a gentle grade must be maintained, such as with a barrier-free trail or where there is permanently flowing water. In all other situations, a wash crossing should be used. Rock or pipe culverts must match the downstream gradient and have a diameter of at least 12 inches to accommodate necessary cleaning. Improperly constructed culverts will clog with debris causing water to flow over and damage the trail tread. All rock use in the construction of culverts must be native.

The proper construction of ***rock*** culverts depends greatly on the proper selection and placement of rocks of sufficient size and shape. The bottom surface of the drainage must be armored with rocks to prevent erosion. Stone headwalls must be placed to armor the outside faces of the crossing. All rocks must be firmly placed similar to the construction of a retaining wall. For ***pipe culverts***, pipe diameter must be at least 12 inches. Embed the pipe in a stable foundation of gravel and soil, and backfill with compacted gravel and soil. Construct a headwall of firmly placed native stone to protect the outside faces of the tread crossing and cover the pipe so it cannot be viewed from the trail. The trail tread should be at least six inches higher than the top of the pipe.

Causeways

Causeways are raised portions of trails used where trails must cross poorly drained areas or where seeps moisten soil tread. These are paths elevated above wet ground using a permeable fill material as a base. Path edges incorporate small boulders or rock rip-rap, usually locally sourced, to contain the permeable fill. Adding rock and elevating the trail allows water to drain to the side and helps prevent the widening that occurs when users try to walk around damp areas. Path construction and detailing depends on site water table depth and surface flows. A stable paving base must be established while allowing for water flow under the trail and should be designed so as not to be compromised by future water flows. Base fill must be firm mineral coarse-grained or granular material, or small, well-graded angular rocks. Causeways are not intended for use to cross wetlands.

Stone Retaining Walls

Stone retaining walls are used to stabilize trails with steep side slopes. Retaining walls are more solid than rip-rap as they must support the full weight of the trail tread. A solid foundation is key to the strength and durability of a retaining wall. The use of retaining walls alongside trails will require specific analysis on a case by case basis to determine the best methods of construction and may require great skill and previous experience or engineering and should be undertaken by skilled and professional construction crews.

Rip-Rap

Unlike a retaining wall, rip-rap does not support the weight of the trail tread. Instead, rip-rap is used to stabilize steep slopes above and below the trail tread (backslope and fillslope, respectively). Begin by clearing a firm foundation at the downhill edge of the rip-rap. Set the larges rocks in the foundation. Place smaller rocks on the surface of the slope continuing up the slope to the desired location. Be sure that the rip-rap does not impede the flow of surface water off the trail tread. Rip-rap can also be used to protect drainage and lead-off ditches from heavy erosion, and to stabilize switchback turns. Rip-rap should be constructed of native rock. If cement is used to provide additional stability, it must be colored to match the native rock.

Wash Crossings

When trails cross washes, the greatest concern is protecting the trail from flowing water. The trail segments approaching the crossing, and the location where the trail meets each edge of the wash, must be stabilized with securely placed rocks. Trail segments approaching the wash should range from 8 to 15 percent for all trail classifications, and cross at a 90 degree angle to the wash to prevent water from leaving the primary channel and flowing along the trail surface. The slopes adjacent to the trail may need to be stabilized with rip-rap. A row of large rocks should be embedded along the wash banks at the point of contact with the trail. Be sure that the flowing water will not undercut these rocks.

Trail Access Gates

Gates are typically employed and designed to restrict motorized access to non-motorized use trails, but where vehicular access is needed for maintenance and emergency purposes. Typically these gates should be located at trailheads, where trails cross major roads, and at other points where motorized vehicles are likely to attempt to access a trail. These gates must be constructed of heavy gauge metal or other durable low-maintenance materials.

7.10 Bridges and Tunnels

Future development of the Carlsbad trail system is likely to include bridge crossings, especially in the I-5 corridor areas of the city's three lagoons. The new structures for the trail system that are part of the transportation infrastructure will create opportunities for overlooks, habitat protection, loop trails and critical east/west trail connections to the coast. Bridges can also provide maintenance and emergency service access. Likely potential use, cost-effectiveness and physical constraints should drive bridge location selection. The following conceptual bridge criteria will serve as a guideline for the development of potential trail bridge crossings.

Wood Trail Bridge

Wooden bridges can provide a cost-effective solution in bridging minor drainage crossings while supporting local trail character. Bridges should be level and avoid a step-up if the trail is intended to be ADA-compliant or will be used by cyclists. Since the life span of wood is limited, recycled plastic composite lumber may be considered as a feasible alternative for the required deck material. If the fall distance is greater than 30 inches, guardrails should be at least 42 inches higher than the bridge surface. Spans greater than ten feet should generally be engineered and may require site-specific geotechnical work. It should be noted that long span wood construction requires similar requirements for abutments and foundation supports as steel bridges.

Ultimate in safe street crossings, but not always used

Prefabricated Steel Truss Trail Bridge

The most common use of prefabricated steel truss bridges is for trail applications in conjunction with parks and trails. Such bridges can be used on relatively long spans of over 100 feet, with virtually unlimited spans possible with intervening supports. Design considerations for prefabricated steel truss bridges include finishes such as weathered (Cor-Ten) steel, paint or galvanizing, as well as deck options such as cast-in-place reinforced concrete, precast planks, open grating, or composite or wood decking. Prefabricated steel truss bridges are available in a variety of design styles and truss types to accommodate project aesthetic and clearance requirements. New bridges should emulate existing installations in the area.

Safe crossing if highly visible and lighted

Bridge Width

For Type 6 trails, bridges would be typical of those commonly used for trails and should be the width of the connecting trail. When a wider multi-purpose bridge is desired to accommodate higher use levels, or to support maintenance or patrol vehicles, bridges should be a minimum of 20 feet wide and constructed to the required load rating.

Tunnels

Tunnels are warranted as methods to get across very busy streets and, if planned for well in advance of roadway extensions, can be feasible regarding costs of construction. However, in most cases, an at-grade roadway crossing with improved pedestrian crossing facilities are more likely to be used by the general public at a lower expense. When essential, the most important aspect of the tunnel is to ensure high visibility for tunnel users and avoid hiding places and alcoves. The use of lighting in the tunnel is also essential since sunlight at two ends makes it very difficult to see through during the day because of high contrast, or if during the night, too dark to pass through.

Tunnels are typically constructed of pre-cast concrete box culverts. Other varieties of culverts are acceptable provided they meet the required dimensions, and allow footing that is appropriate for all types of trail users. The width of a trail traveling through an underpass should not be less than 12 feet. Vertical clearance is an important concern, particularly for equestrian trail users. The minimum vertical clearance is 9 feet at a distance of 4 feet from the centerline, and 11 feet at a distance of 3 feet from the centerline. Natural or vandal-resistant electric lighting should be installed for safety. Sight distances approaching and exiting the underpass must be adequate for safety. Underpass design must not allow the accumulation of nuisance water on the trail. If water does not drain from the underpass by gravity flow, a pump system must be provided to remove the water. The surface of the underpass should be slip resistant.

Mid-block Road Crossings

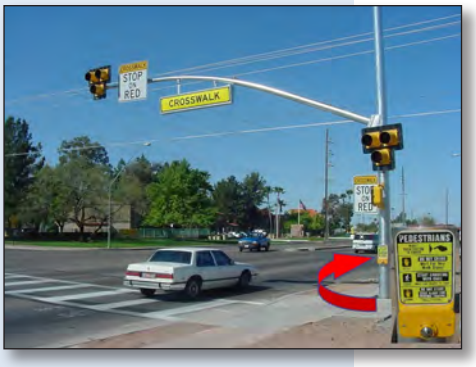
Allowing trails to end at the middle of a busy street is not proper trail planning and should be avoided. Placing signs stating the need to walk to the nearest intersection is not a solution unless it is less than 100 feet to the intersection. If the distance is less than 100 feet in either direction, it is reasonable to expect a trail user to use the intersection. If it is further, it is much more likely that a trail user will jaywalk across the roadway. A variety of mid-block crossings address this issue and can improve safety. If only one lane exists in each direction, then a non-controlled crossing may work if median refuges, high visibility striping, signage and mid-street rubberized warnings stating the state law requiring drivers stop for pedestrians are installed. For multiple lanes, a HAWK or a Rectangular Rapid Flashing Beacon system should be used.

Marked crosswalks is okay if only one lane each direction

Uncontrolled crosswalks should include signage, a median refuge and a state yield law sign

Multiple lanes require positive protection such as this Rectangular Rapid Flashing Beacon

A hybrid signal and warning system known as a HAWK (high intensity activated crosswalk beacon) or PHB (Pedestrian Hybrid Beacon) is very effective at stopping vehicles



7.11 Boardwalks

Boardwalk construction may be used to span sensitive areas such as stream riparian zones, unavoidable wet areas and depressions, and in areas of steep slopes. They can also be used to provide trail access in areas where grading and filling may harm tree roots or create trail surfaces that wildlife will not cross. Boardwalks should be considered in relation to environmental impacts, available budget, potential user needs, and operations and management issues. The following conceptual boardwalk criteria will serve as a guideline for the development of any boardwalks identified in the trail system.

Sample boardwalk at San Dieguito Lagoon

New boardwalk crossing at Calavera Lakes

Boardwalk Materials

Proposed boardwalks must meet AASHTO design recommendations for Type 6 trails. Boardwalks should be structurally designed to support the weight of a small truck or a lightweight maintenance vehicle. For boardwalk deck construction, wood lumber is typical. Composite lumber provides a longer useful life compared to wood, is a heavier weight material to reduce floating in flood-prone sites and the pronounced texture can reduce slippery surfaces. While composite lumber typically costs more than wood, its durability can make it more cost-effective over the life of the structure and is now commonly employed for boardwalks and bridge decks in open space.

Boardwalk Height from Ground

The boardwalk height should be set to allow small animal movement under the structure, a minimum of six inches above grade. Footings will vary depending on soil conditions, and a geotechnical investigation is recommended. Prefabricated modular footings are recommended to reduce construction environmental impacts. Boardwalk width should be the same as that of the trail type for which it is built.

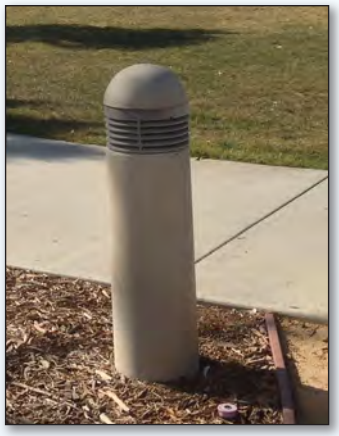
Boardwalk Railings

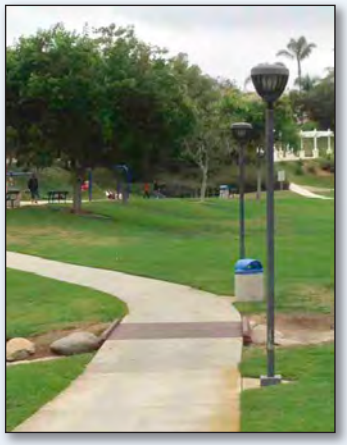
AASHTO recommends 42 inch high railings on any structure or path more than 30 inches above adjacent grade. Boardwalks less than 30 inches above grade may not require a railing according to current building standards. Curb rails alongside the edge of boardwalks are highly recommended to assist in warning trail users that they are traveling close to the edge.

7.12 Lighting

The need for lighting should be carefully determined on a case-by-case basis. In general, trails themselves should not be lighted, but where there is a demonstrated need, lighting does allow nighttime use of specific trail segments and provides a measure of trail safety. For example, lighting may be considered at bridges, at public gathering areas along the trails and at trail access points. Lighting should not be considered where nighttime use is not expected or allowed, adjacent to sensitive wildlife habitat areas, or along residential areas unless shielded. Matching or complimenting light fixture style and types with other site furnishings will strengthen the overall trail branding.

Light color should be considered in the selection, since consistent color illumination will visually enhance and link the trail at night. All light sources should provide a warm white color light. A wide variety of lighting options are available in terms of style and material selection, as well as energy efficiency. A licensed or qualified lighting expert should be consulted before making any lighting design decisions. Doing so can reduce up-front fixed costs and long-term energy costs. As appropriate, dark sky-compliant lighting should be selected to minimize light pollution cast into the sky while maximizing light cast onto the ground. Stand-alone solar-powered light





Type 4 or 6 trails benefit from lighting but great care is needed not to spill over light into adjacent wildlife or development

fixtures continue to come down in cost as fixture, battery and photovoltaic technology improves, and should be utilized where possible for new installations or retrofit projects, especially where supplying electrical power may be prohibitively expensive.

Roadway Crossings

The design of all trail roadway crossings should include lighting for the comfort, safety and convenience of roadway and trail users. Properly designed lighting provides cues to drivers to expect trail users at crossings. FHWA HT-08-053, The Information Report on Lighting Design for Mid-block Crosswalks, found that a vertical illumination of 20 lux in front of the crosswalk, measured at a height of five feet from the road surface, provided adequate detection distances in most circumstances. Although this research specifically addressed mid-block crosswalk placement, the report includes a brief discussion of considerations in lighting crosswalks co-located with intersections and the same lighting principles apply there. Illumination just in front of crosswalks creates optimal visibility of pedestrians. Crosswalk lighting should also provide color contrast from standard roadway lighting.

Energy Conservation

Where lighting is included in projects, some trail and roadway or crossing lighting may be required. The use of energy-efficient Light Emitting Diode (LED) lighting fixtures should be considered for these applications. LED lighting is becoming an alternative illumination source to replace commonly used high pressure sodium vapor (HPSV) lighting.

LED efficiency benefits include long life (up to 100,000 hours) and reduced maintenance due to longer periods between lamp module replacements, but the greatest benefit is reduced energy consumption by as much as an estimated 60 percent when compared to comparable output HPSV lamps. LED can have a lifetime of 12-15 years and a cost recovery of approximately three years.

LED lighting can be used with various light fixtures for various applications. The benefit of lower energy consumption and reduced maintenance costs are very attractive and support the installation of LED lighting. The following is a brief summary of advantages to using LED lighting versus conventional technology:

- Low power consumption and reduced maintenance costs;
- dimming capability;
- more accurate color rendering;
- quick turn on and restart;
- does not contain toxic lead or gas;
- ease of light spillage control where light is undesirable;
- and high output at low temperatures

7.13 Signage Guidelines and Standards

Signs provide information. They need to do so in a consistent and clear manner. Too many signs negatively affect the trail user experience and clutter the visual environment. Finding the right balance is important. Signs should be limited to trailheads and key decision points for wayfinding along the trail or where important educational opportunities exist. Regulatory signs may need to be placed in areas where extra controls and instructions are needed.

City of Carlsbad Trail Signage Guidelines and Standards

The City of Carlsbad has developed guidelines and standards that should be considered the primary guidance for any signage issues, including specifications such as size and color. The following guidance should be considered supplemental to the city's requirements.

Signage and Trail Branding

Trail signage systems with clear thematic design provide messaging consistency. The Carlsbad trail system's existing route signage conveys uniform quality and credibility, enhancing the trail experience. Incorporating the branding or themes in basic amenities such as site furnishings, fencing and gates, lighting, hardscape and structures, signage and art pieces help reinforce the Carlsbad trail brand or "sense of place." Some trail elements and amenities that can incorporate Carlsbad trail branding are described in the following sections.

Branded directional sign

Trailhead Signage and Information

Signs that clearly describe trail conditions are an essential component of trail experience. Signs should be provided in an easy-to-understand graphic format with limited text. Providing accurate, objective information about actual trail conditions will allow people to assess their own interests, experience and skills and to determine whether a particular trail is appropriate or provides access to them with their assistive devices. Providing users with trail condition information is strongly recommended for the following reasons:

- Users are less likely to find themselves in unsafe situations if they understand the demands of the trail before beginning.
- Frustration is reduced and people are less likely to have to turn around on a trail because they can identify impassible situations, such as steep grades, before they begin.
- Users can select trails that meet their skill level and desired experience.
- The level of satisfaction increases because the user is able to select a trail that meets his or her expectations.
- If more difficult conditions will be encountered, users can prepare for the skill level and equipment required.

At a minimum, the following information should be provided at all trailheads on the main trailhead sign:

- Trail name;
- permitted users;
- path length;
- elevation change over total length and maximum elevation obtained;
- average running grade and maximum grades that will be encountered;
- average and maximum cross slopes;
- average tread width and minimum clear width;
- surface type; and
- surface firmness, stability and slip-resistance

Too crowded and poorly arranged signage

Well arranged and designed signage

Simple directional sign

A comprehensive signage system ensures that information is provided regarding the safe and appropriate use of all trails, both on and off-road. Signage should establish style, font and color consistency and present a unified appearance to promote the perception and branding of the Carlsbad trails as a unified system. Project signage may include directional, distance, interpretive and regulatory/advisory.

Directional and other typical signage will occur primarily at staging areas, trail heads and potentially other locations where users may regularly access the trail system. Trail distance markers should occur on a regular interval of at least once per quarter mile for any trail more than one-half mile long. These markers are useful to both trail users and to first responders to locate injured persons. Interpretive signage may occur almost anywhere to coincide with a point of public interest, but will likely be more condensed at the staging areas, trail heads and vista points where users are more likely to spend time off the actual trail surface resting or enjoying the view. For all but regulatory signs, this system's signage should be comprehensively designed as a definitive signature element encompassing the overall trail system.

Regulatory Signage

Regulatory signs should state the rules and regulations associated with trail usage, and identify the managing agency. The trail regulations message is to promote user safety and enhance the user enjoyment. It is important to post trail use regulations at trailheads and key access points. Typical trail regulation signs may include:

- Route identification, reassurance and confirmation;
- guidance and distance to trail destinations and key points of interest;
- safety features and user safety;
- warnings of known hazards;
- hours of operation;
- pedestrian, bicycle, equestrian and vehicular traffic control;
- dog leash requirements;
- alcoholic beverages are not permitted on trails;
- notice of restrictions where use control is necessary;
- do not wander off of trail onto adjacent properties; and
- resource protection information.

Bike Route Signage

Mainly within public right-of-ways, Class III bicycle routes are identified through route signage using the standard "Bike Route" sign. The CA MUTCD allows alternative bicycle route sign plaques to reflect a numerical route or name designation placed below the route signage. For Class I paved trails, supplemental signs and plaques can be used to direct cyclists and pedestrians to destinations.

Directional Signs

Directional signs should provide route and distance information to major destinations and trail amenities. Directional signs should be installed at staging areas, access points and major trail intersections.

Trail Markers

Trail markers provide visual reassurance that the user is on the desired trail. Trail markers can also double as distance markers and should occur at regular intervals of at least every quarter mile. These markers are useful for recreational purposes, as well as for providing first responders a means to locate injured persons.

Kiosks

Kiosks provide visitors with information to orient themselves, learn about trail conditions and opportunities, trail regulations, hours of operation, local events such as activities programmed for the Parks and Recreation Department or the Carlsbad Trail Volunteer Program, or within the open space. Kiosk design and style should reflect Carlsbad trail sign system character and branding. Kiosks should be readily identifiable by trail users as informational contact stations and provide elements such as bulletin boards, regional trail maps, rules and regulations and accessibility advisories.

Interpretive and Educational Signage

Interpretive signs enhance the trail or bikeway experience by providing information about the history and culture of the area. Such exhibits may discuss local ecology, people, environmental issues and other educational information. Educational signage may be placed at scenic view areas or in relation to specific elements being interpreted. They may take on many forms including textual messages, plaques, markers, panels and demonstrations.

Interpretive signage may occur almost anywhere to coincide with a point of public interest, but will likely be more condensed at staging areas, trailheads and vista points where users are more likely to spend time off the actual trail surface resting or enjoying the view. Because interpretive signs need to relate directly to the needs of a site, no specific guidelines have been established for their format. However, interpretive signs should be concise and integrated into an overall area sign plan, including the wayfinding signs mentioned previously. In addition, they should be constructed of highly resilient materials with easily cleaned or repaired surfaces.

Warning signage should be made into permanent signage

7.14 Specific Trail Signage Guidelines and Standards

Locations

The proper location of signage is important to ensure the safety of trail users, preserve the natural environment, and promote the presence of the trail. The number and location of signs should be carefully considered, as a lack of signage or poorly located signs can create hazardous situations for trail users. An overabundance of signs can also detract from the aesthetics of the trail and decrease the quality of the trail users' experience.

Trail signs are typically located at trailheads, trail intersections, and locations where trails cross roadways, and at any other areas where it may be difficult to follow the route of the trail. Trail signs should be installed two feet from the edge of the trail to allow proper clearance by trail users.

Signage Types and Location Requirements

Primary Signage

Location Requirements: Staging Areas/Primary Access Points- Indicate locations on improvement and landscape plans for primary signage locations. Final locations must meet the approval of the City of Carlsbad.

Required Elements: Preferable information and amenities for this type of signage would be a kiosk or monument with a panel to include:

- Trail map;
- trail regulations (attached at end of this section);
- brochure dispenser for trail maps/brochures;
- pet waste station with appropriate signage and waste receptacles; and
- interpretive Information i.e. Historical facts and/or information on local flora and fauna or cultural resources.

Moderate level of kiosk displaying some interpretive material

Trail Interpretive Signage: Trail interpretive signage may be located at primary entry points, usually referred to as trailheads or trail access points, trail nodes or staging areas. This signage informs the trail users about the unique habitat, wildlife or other characteristics of the trail and to educate the public about the open space system that the trail is located within or about the citywide trail system. It may also include information on trail rules and connections to other points of interest associated with the community such as nearby city parks and trails or nearby schools and businesses. Typically there are two physical components to this type of signage: A base and an interpretive panel with a narrative of information for the trail user as described above.

Interpretive Panels: Interpretive signage panels should consist of a durable material that can withstand the outdoor elements of Southern California and should meet the approval of the city. The City of Carlsbad logo should be included on the interpretive panel. Submit a sample or specification of the materials to be used, a mock up indicating the proposed size, layout, background color and design to the City Parks and Recreation Department.

High level of interpretive signage

Interpretive Signage Supports: Recyclable plastic materials and metal posts with a painted powder coat type finish are also acceptable for interpretive sign supports and bases. All post footers must have a 3 foot deep by 12 inch round minimum concrete base.

ADA Compliance: All interpretive signage must be accessible to those with disabilities and comply with the most recent requirements and guidelines for Americans with Disabilities Act Accessibility Guidelines; Recreation Facilities. At trailhead parking areas, ADA signage and parking space stamping must be in compliance with current San Diego Area Regional Standard Drawings.

Trail Regulation Signage Standard Specifications

Location Requirements: Trailheads and Staging Areas

A. Blanks

Sign blanks must be 0.080 gauge aluminum. Blanks must be covered with reflective sheeting of street transportation quality vinyl. There must be two pre-drilled 3/8" holes. The holes must be centered horizontally with the center of each hole being ½" from the top and bottom edges. Corners must be rounded with a 1" to 1-½" radius, dependent on the size of the sign.

B. Lettering

Font must be Garamond. Point size should be relative to the size of the sign.

C. Colors
Background must be dark brown, Pantone 7532 C (CMYK: 50,60,70,35) with reflective white lettering and symbols. There must be a ¼"- ½" white reflective border.

D. Dimensions
22" wide by 28" high with rounded corners (approx. 1.5 ")

E. Typeface

Mixed lowercase and uppercase:
- Body text: Arial Bold, 36 pt., tracking: 60
- First initial, header: Adobe Garamond Pro, Semibold, 172 pt.
- Remaining header text: 142 pt
- Subheader: Arial Bold, 56 pt., tracking 60
- Sidebar: Adobe Garamond Pro, Bold, 122 pt., tracking 150

F. Border
White reflective border is approx. 21 points wide (on top, bottom and right) and 3.25" wide on left) and positioned ½" from edge.

G. Art Ready Graphics (City Seal)
Available by contacting the City of Carlsbad Recreation Department Graphics division. Phone 760 434-2826, to arrange for art ready graphics.

H. Sign Mounting Hardware
3/8" vandal resistant steel drive rivets.

I. Sign Post/Anchor Specifications
1) Posts-Posts shall be constructed of 1 ¾" x 1 ¾" 12-gauge square steel tubing with 7/16" pre-punched knockouts on 1" centers. Post lengths must be 8' to allow for 2' burial below finish grade within the sign post concrete footing. All steel posts shall be sandblasted with 100-grit sand and chemically treated to provide a natural looking "rust" finish. The application of rust-colored paint is not acceptable.

1) Anchors - Anchors shall be 2" x 2" x 30", 12-gauge galvanized square tubing with 7/16" pre-punched knockouts on 1" centers.
2) Sleeves - Sleeves shall be 2 ¼" x 2 ¼" x 12", 12-gauge galvanized square tubing with 7/16" pre-punched knockouts on 1" centers.
3) Anchor Assembly Hardware - 3/8" vandal resistant steel drive rivets.
4) Telescoping Properties - The finish post, anchor and sleeve must be straight with a smooth uniform finish to allow each component to telescope with each consecutive larger or smaller piece.

J. Installation
Sign posts are to be installed at locations which meet the approval of the City of Carlsbad. The final height of the metal post shall be 6' above finish grade. The signage should be placed in more prominent locations such as trail access points or major trail junctions. All signs are to be mounted to the posts with 3/8" vandal resistant drive rivets.

Standard entry marker

Standard regulatory sign

Branded trailhead entry signage

Trail "Post" Specifications

Trail post markers typically refer to a post placed alongside the trail. The post will typically have symbols or text to identify the trail uses, location (i.e. 0.25 miles) or directional arrows directing trail users along the way. This section shall apply to:

- Trail Head and Main Trail Access Points
- Directional Markers
- Mile Markers

Trail Head/Trail Entrance Markers

Location Requirements: Locations for trail entrance markers shall be indicated on improvement plans and landscape plans. Trail post markers will be required at secondary entrances and key entry points to citywide trails.

Materials Requirements: Trail markers shall be 6"x6" flat bevel top hardwood treated lumber or recycled plastic. Color shall be Desert Tan for recycled plastic products.

Trail Post Placards for Trail Entrance Markers: Trail head or trail access markers shall include placards showing trail uses and the citywide trail logo for the purposes of designating a citywide trail from private community trails. (Private community trails are typically short spur trails that connect to the city's public trails used by residents of a master planned community to access the Citywide trail system.)

The trail use placards shall include at a minimum of four per post: a hiker, bicycle, dog on a leash, and the city trail logo. Citywide trail logo placards are available from the Parks Maintenance Supervisor at 760 434-2826. Trail use placards can be provided by the City of Carlsbad. The trail head markers shall extend 42-48" above grade and be placed alongside the trail at 18"-24" off of the trail edge.

Trail Mile Markers

Requirements: Mile markers for the trail will be standardized for easy reference by maintenance, police and fire personnel. Mile markers will be required on any trail that is over 0.5 miles long, with trail mile markers posted every 0.25 miles. ***Trail mile markers shall be 6"x6" flat bevel top premium grade recycled composite plastic lumber. Color shall be approved by Parks and Recreation Department. Posts shall have a graffiti resistant type coating.*** The trail head markers and mile markers shall extend 40" above grade and be placed alongside the trail, 18" off of the trail tread. An approved equal may be substituted with city approval. On mile markers, the number should be placed on two sides of the marker so that it can be seen in both directions of travel by trail users. The number shall be routed or engraved into the post 2" below the bevel and shall be a 3" letter height. The routed number shall be finished in accordance with the manufacturer's recommendations and painted either a dark brown or dark forest green color to provide sufficient visual contrast from the post color so that the number is readily discernible.

Citywide Trail Logo

The city's trail logo may be obtained in a digital format for signage use by contacting the City Parks and Recreation Department at 760 434-2826.

Specialty Signage

Private Property: Signage requests made to the city and/or when permission is granted by the city to install signage, for example when an HOA managed area is adjacent to an existing citywide trail and they would like to post additional signage.

Resource Agency, Conservation or Sensitive Habitat Areas (adjacent to trail): This refers to signage often required by resource agencies such as the CA Department of Fish and Wildlife, U.S. Fish and Wildlife Service, or the Center for Natural Lands Management.

Contact the specific agency for signage requirements and locations for installations adjacent to open space areas not specific to the trail. This type of signage will not be provided or installed by the city unless directed to do so by the resource agency as part of city developed trails.

7.15 Design for Risk Management Considerations

The International Mountain Biking Association's (IMBA) ***Managing Mountain Biking: IMBA's Guide to Providing Great Riding*** provides an excellent overview of safety and risk management concepts and guidance that are applicable to all types of trails and paths. Much of the information provided here is abstracted from that document. Risk management's role is not to remove all risk, and therefore the challenging or interesting aspects of a trail system, but to identify and address unreasonable hazards that might cause harm to trail users.

The majority of information sources that addresses risk management on trails agree that the best overall risk management practices are to properly design, construct and maintain trails. When it comes to trails, the old cliché of "prevention is the best medicine" holds true. Risk management techniques both protect trail users from injury and offer a measure of protection from lawsuits for trail managers.

The following risk management practices come from multiple resources and are condensed here for easy reference. These include design techniques, plan implementation and policy guidelines:

- Design for risk management: Many risk management concerns can be mitigated and addressed before a trail system is constructed simply by understanding what risks currently exist in the environment and identifying and understanding the intended users.
- Design the trail system according to generally-accepted standards: Hazards and liability can be limited by adopting generally-accepted design standards during the trail design phase. Documents such as the 2010 Draft AASHTO Guide for the Planning, Design, and Operation of Bicycle Facilities and Americans with Disabilities Act (ADA) guidelines are accepted and used by most design professionals and reviewing agencies.

Design the trail system using CPTED principles: CPTED stands for Crime Prevention Through Environmental Design and is defined as the "multidisciplinary approach to deterring criminal behavior through environmental design." The four main CPTED principles are:

- Natural surveillance: Keep the environment maintained so people can be easily seen by other users, staff, and anyone who may pass by the trail system. Design landscaping to avoid blind spots and hiding places. Ensure adequate light levels.
- Natural access control: Control natural access by some means such as fences or landscaped areas. For example, for a hiking only trail, access methods should clearly signal "walk here" and "do not walk" there, so that a walker would not look out of place.
- Territoriality: Use territoriality reinforcement to distinguish public and private spaces, including signage and landscaping. This is intended to indicate that someone owns and cares about a space. A space that looks cared for can deter illegal or undesirable activities.
- Maintenance: Only build what can be maintained. Without maintenance, a public area invites criminal behavior such as graffiti and other vandalism.

7.16 Specific Standards for Open Space Trails (Type 1)

Grade

Maximum sustained grades should not exceed 15%. A maximum grade of 20% is allowed for wash crossings, grade dips, and other trail segments to avoid impassable areas for a distance not to exceed 25 linear feet. Switchbacks may be utilized when surrounding terrain has a side slope of 20 to 45%. Switchbacks supported by retaining walls may be utilized when surrounding terrain has a side slope up to 55%.

Tread

Type 1 trails should have a minimum width of two feet. The trail surface should be native soil and must be smooth and free of major obstacles. Compaction of the surface may be necessary to prevent damage from use and to increase resistance to erosion.

Vegetation Clearance

Trails should be designed to have a minimum impact on plants identified for protection in the city's HMP Plan. Trail alignments that avoid and have the least impact on surrounding vegetation are preferred. If the trail must pass within an unacceptable distance of any plants, the preference is to relocate the plants rather than destroy them. Vegetation may not exceed a mature height of three feet within a three-foot distance of the trail tread. Vertical clearance must be at least eight feet above the trail tread. This in no way implies that the trail corridor should be devoid of plants. Low growing coastal sage scrub presents no hazard to trail users, and therefore is acceptable to have within the clearing limits. The purpose of the vegetation clearing limits is to keep taller, potentially more dangerous plants such as thorny trees and larger cacti a safe distance from the trail. All remaining roots and stumps must be grubbed out of the trail surface to provide a smooth tread.

Drainage

The trail surface must have a cross slope of no less than two to three percent. This is critical in preventing water from pooling on and channeling down the trail. If the trail traverses the side slope of a hill, the cross slope of the trail surface must be downward from the uphill to the downhill edge of the trail (outslope). This will allow surface water to drain off the edge of the trail rather than running down the length of the trail. The installation of erosion control structures may be required. The cross slope of such a trail tread must NOT be downward from the downhill to the uphill edge of the trail (inslope). Such a scenario will result in water channeling down the length of the trail, causing extreme levels of erosion. If the trail is located on level ground, the trail surface should be crowned to drain water off the trail and prevent pooling.

7.17 Specific Standards for Open Space Trails (Type 2 and 3)

Grade

Type 2 trails will need to be held to ADA requirements of 8.33%. Barrier-free trails are designed to provide opportunities for persons with physical disabilities including mobility, visual, and hearing impairments, and shall meet the standards of the Americans with Disabilities Act Guidelines (ADA). This manual contains only general guidelines for the design and construction of barrier-free trails. The planning, design, and construction of barrier-free trails within the City of Carlsbad requires the involvement and subsequent approval of appropriate city representatives, including the Recreation and Engineering staff.

Type 2 trails must be designed with the least possible longitudinal slope. The maximum sustained grade shall not exceed 8.33%. Trail segments that exceed the maximum 5% sustained grade limit must be constructed according to handicapped accessible ramp standards. Barrier-free trails must not be constructed on side slopes greater than 40%. Total trail distance should not exceed 1.5 miles.

Tread

There are many varieties of accessible surface materials available. The chosen surface must be stable, firm and slip resistant. The material must match the surrounding environment. Trail Type 2 widths will vary from four to eight feet with six feet considered to be the most desirable in sensitive habitat areas. No maximum width standard is applied to Trail Type 3 except they should be at least ten feet wide to accommodate maintenance and utility vehicles. Type 3 trails should be in accordance with the utility requirements for access and maintenance needs. The trail tread should be comprised of native soils in undisturbed sensitive habitat or vegetation areas, and decomposed granite in areas that have been graded, landscaped, or will otherwise remain significantly unnatural. Compaction of a native soil tread surface may be necessary to prevent damage from use and to increase resistance to erosion. If decomposed granite is used, it must be ¼" minus Madison Gold (or similar), wetted and compacted to a four inch depth. A stabilizer may also be added to the decomposed granite according to the manufacturer specifications. The trail tread must be smooth and free of all obstacles. The trail tread must be delineated from the surrounding terrain.

Edging

For Trail Type 2, edging materials should be four to six inch wide concrete, with a twelve inch depth minimum, control joints shall be located approximately every eight feet on center.

Vegetation Clearance

Trails should be designed to have a minimum impact on plants identified for protection in the City of Carlsbad. Trail alignments that avoid and have the least impact on surrounding vegetation are preferred. If the trail must pass within an unacceptable distance to any plants, the preference is to relocate the plants rather than destroy them. Vegetation may not exceed a mature height of three fee within a three foot distance of the trail tread. Vertical clearance must be at least ten feet above the trail tread. This in no way implies that the trail corridor should be devoid of plants. The purpose of the vegetation clearing limits is to keep taller, potentially more dangerous plants such as thorny trees and larger cacti a safe distance from the trail. All remaining roots and stumps must be grubbed out of the trail surface to provide a smooth tread.

Drainage

The trail surface must have a cross slope of one to three percent. This is critical in preventing water from pooling on and channeling down the trail. If the trail traverses the side slope of a hill, the cross slope of the trail surface must be downward from the uphill to the downhill edge of the trail (outslope). This will allow surface water to drain off the edge of the trail rather than running down the length of the trail. The cross slope of such a trail tread must not be downward from the downhill to the uphill edge of the trail (inslope). Such a scenario will result in water channeling down the length of the trail causing extreme levels of erosion. If the trail is located on level ground, the trail surface should be crowned to drain water off the trail and prevent pooling. The longitudinal slope of barrier-free trails must be kept to the minimum standard, therefore the installation of erosion control structures is not necessary.

7.18 Specific Standards for Roadside & Connector Trails (Type 4) and Paved Multi-use Paths (Type 6)

Grade

In most cases, grades for Circulation Element Trails will be compatible with determined road grades since the Circulation Element Trails are adjacent to the city's roadways.

Tread

Transportation based Type 4 Roadside or Connector Trails should have a standard width of at least five feet but can be up to twelve feet. The trail can either be hard surface asphalt or concrete or a firm surface such as stabilized decomposed granite. DG should be used in areas that are not heavily used and along natural open space areas or when the character of the trail is intended to be more natural in appearance. If decomposed granite is used, it must be ¼" minus Coyote Gold (or similar), wetted and compacted to a four inch depth. A soil stabilizer should be added to the decomposed granite according to the manufacturers specifications and installed per the city specifications for installation of stabilized decomposed granite trails. The trail tread must be delineated from the surrounding terrain. For example, utilizing decomposed granite of a different though similar color in the surrounding landscape will help distinguish the trail tread. The location of landscape plants, fences and other physical barriers can also be used to delineate the trail.

Because of the nature of the uses on a multi-use trail, all Type 6 trails are defined as paved trails and therefore must consist of concrete or asphalt surfaces.

Edging

Edging materials shall be four to six inch wide concrete, with a twelve inch depth minimum, control joints should be located approximately every eight feet on center.

Vegetation Clearance

Trails should be designed to have a minimum impact on plants identified for protection in the City of Carlsbad. Trail alignments that avoid and have the least impact on surrounding vegetation are preferred. If the trail must pass within an unacceptable distance to any plants, the preference is to relocate the plants rather than destroy them.

Vegetation may not exceed a mature height of three feet within a three foot distance of the trail tread. Vertical clearance must be at least 10' above the trail tread. This does not imply that the trail corridor should be devoid of plants. The purpose of the vegetation clearing limits is to keep taller, potentially more dangerous plants such as thorny trees and larger cacti a safe distance from the trail. All remaining roots and stumps must be grubbed out of the trail surface to provide a smooth tread.

Drainage

The trail surface may have a cross slope minimum of 1.5% to a maximum of 5%. This is critical in preventing water from pooling on and channeling down the trail. If the trail traverses the side slope of a hill, the cross slope of the trail surface must be downward from the uphill to the downhill edge of the trail (outslope). This will allow surface water to drain off the edge of the trail rather than running down the length of the trail. If the trail is located on level ground, the trail surface should be crowned to drain water off both sides of the trail and prevent pooling.

Chapter 8

Trail Operation and Maintenance

8 Trail Operations and Maintenance

8.1 Introduction

Proper maintenance of the City wide trail system is of utmost importance for providing a safe and productive use of the facility, protecting the financial investment each community has made in constructing the trails, and for continued future recreational benefit to citizens and visitors of the City.

8.2 Overview of Trail Maintenance Responsibilities

The following list represents the major trail maintenance tasks that will be performed by the City's Park maintenance staff:

- Coordination with Home Owners Association trails maintenance personnel (for developer built trails) on maintenance issues during the period of transition from private trail use to public trail use.
- Coordination with City Trail Volunteer Program Coordinator and trail volunteers who assist, in the maintenance duties of the Citywide trails.
- Routine inspections.
- Assistance in responding to maintenance for the trail system pertaining to those items raised by trail users and/or trail volunteers performing the routine trail inspections and maintenance duties.

8.3 Maintenance Schedules

Trail system maintenance begins immediately following construction and is an on-going aspect of operations. Not only do maintenance activities keep the trails in good condition, they help ward off claims of negligence and illegitimate or undesirable uses. This section discusses typical maintenance schedules that will protect the city's trail system investment (see "Table 8.1 Trail Maintenance Activities and Frequencies"). Trail operations and management require daily tasks, whether it is a vandalized sign or an injured trail user, the city must be prepared to deal with all types of concerns.

Table 8.1 Trail Maintenance Activities and Schedule

Maintenance Item	Estimated Frequency
Trash pick-up	2x per week
Remove fallen trees	As needed
Pothole filling	As needed
Bollard repair or replacement	As needed
Graffiti removal	Monthly or as needed
Refill Dog waste bags	Min. 1x per week
Pavement sweeping	4x per year
Weed control	2x per year or as needed
Tree pruning if encroachment on trail	2x per year
Sign replacement / repair	As needed
Fence repair and replacement	As needed
Clean drainage system	1x per year or after storm
Drinking fountain repair or maintenance	As needed
Bench repair or maintenance	As needed
Pavement sealing/repaving	3-5 years as needed
Unpaved trail tread maintenance	1x per year or as needed
Kiosk repair and maintenance	As needed
Dog station replacement and repair	As needed
Trail edging repair or replacement	As needed

The City will adhere to the general maintenance schedule identified above and will take appropriate immediate actions to address any condition deemed a safety hazard. Many of these maintenance items are dependent on the type and amount of landscaping and supporting infrastructure that is developed along the trail. Maintenance activities will be coordinated so as to minimize impacts to trail users and to maximize cost efficiencies through the use of trail volunteers.

8.4 Trail Closures

The trail may be closed if any heavy equipment is expected to use the trail, or when any maintenance activities are occurring that could be unsafe for the general public. Trail users will need to be managed during these closures. Parks Maintenance is responsible for advising the City Trail Manager at least five (5) working days in advance of such scheduled maintenance and to coordinate and provide the appropriate measures to close the segment of Trail, arrange detours, and notify the public.

The policy for the procedures that will be followed prior to the Trail closing, including a variety of means to inform the public, are listed below:

- The Trails Manager will provide at least 48 hours advance notice to volunteer Trail captains on the impacted segments to be closed indicating the expected duration of the closure. The Trails Manager and Parks Maintenance staff will coordinate in efforts to keep the public informed regarding the trail closure and make every effort to keep the closure period as short as possible;

- The City will physically close off the Trail that is being worked on with barriers, and post "Trail Closed" signs with a contact number for information.
- The City will provide detour signs where Trail users can reasonably be detoured to other routes If no reasonable alternate routes are available, the Trail should have an "End Trail" sign and provide access to the sidewalk system.

Permanently Close Chronic Problematic Trails

Trail segments may need to be permanently closed due to degradation or if they pose hazards to users, or have begun to adversely impact sensitive environmental or cultural resources. In these instances, it must be clearly communicated well in advance to staff, trail users and any other relevant groups that the trail is closing. Newsletters, kiosk notices, email, websites and meetings can be used to forewarn visitors that a specific section of trail will no longer be open and to explain the rationale behind the closure. Signs should be posted in advance of the closure and left up until no evidence of the trail remains so visitors are not tempted to detour from the new route. Other techniques include installing gates, planting vegetation at access points, and camouflaging access points with stumps, logs or brush.

Temporarily Close Trails Due to Inclement Weather and Emergencies

There may be times when it is appropriate to temporarily close the trail system due to emergency situations, inclement weather, flooding, or accidents. The operations and management plan should include an inclement weather policy that details procedures for warning visitors of poor trail conditions, closures and detours.
If there are locations prone to flooding or other issues that result from severe weather events, consider posting an inclement weather policy on the city website, on signs at the trailhead, in newsletters and via email list-serves. Seasonal trail closures are common where weather conditions are known to be consistently poor.

8.5 Carlsbad's Trail Maintenance Standards

The city has developed a trails inspection form to identify, record, and respond to maintenance problems, and to keep written records of such actions (see "Table 8.2 Trail Maintenance Inspection Form"). The following maintenance duties are considered basic to all soft surface trails.

Citywide Trail Inspection Form

Date:_____ **Inspected By:**_____

Trail Name	Nearest Cross Streets	Type	Comments
		☐ Open Space Trail ☐ Circulation Element Trail	
Item	**Condition**	**Location**	**Repairs Needed**
Surface Condition Type_____	☐ Good ☐ Poor		
Erosion	☐ Present ☐ Not Present		
Edging Type_____	☐ Good ☐ Poor		
Landscaping Pruning ☐ Planting ☐ Removals ☐			
Signage	☐ Good ☐ Poor		
Fencing Type_____	☐ Good ☐ Poor		
Drainage Swales	☐ Concrete ☐ Earth/Stone		
Steps/Stairs/Perons Handrails	☐ Good ☐ Poor		
Other: (Mark only if repairs are needed) Benches ☐ Drinking Fountains ☐ Trash Containers ☐ Dog Waste Dispenser ☐			

For immediate trail maintenance items, please contact Park Maintenance at 434-2985 Such examples would include trees fallen over trails or drainage wash outs after a storm event.

Table 8.2 Trail Maintenance Inspection Form

A. Slough and Berm Removal

Slough (pronounced "sluff") is material that has moved downhill from the backslope and been deposited along the uphill edge of the tread. This process causes trail users to travel along the outside edge of the trail. The tread eventually narrows and moves downhill from its original location, resulting in an unsafe situation. The slough must be removed to reestablish the proper backslope. The excess material may be used to fill holes in the trail and reestablish the outslope, or to build up the downhill side of waterbars. Berm is soil that has built up on the downhill edge of the trail tread. Berm prevents water from flowing off the side of the trail and allows water to channel down the trail, causing erosion. A berm may also cause nuisance water to pool on the trail surface, resulting in soil saturation. Saturated soil is damaged easily and forces trail users to detour around the area, causing the trail to widen. Berms should never be constructed intentionally, and should be eliminated whenever present.

B. Vegetation Clearance Maintenance

All plants encroaching on the vegetation clearance limits for the particular trail classification must be cut back. Branches should be close to the main stem without cutting into the branch collar. Plants being removed must be cut flush with the ground and stumps must be removed to prevent safety hazards. All plants growing within the trail tread must be grubbed-out. Trails within landscaped areas may be sprayed with herbicide. All removed plant material must be scattered in a location not visible from the trail.

C. Tread Maintenance

In addition to slough and berm removal, the remaining trail tread should be restored to a safe walking condition. All loose rocks, rock points, stumps and roots protruding from the trail surface should be removed. All holes should be filled to create a smooth, obstacle-free trail tread. Maintaining a proper outslope is critical to the long-term condition of the trail.

D. Drainage Maintenance

Special attention should be directed to the maintenance of drainage structures. These structures are extremely important in protecting the trail from erosion. If they are not maintained properly, the trail will be prone to erosion, and may become unsafe for public use and require extensive amounts of labor to repair. All repairs to drainage structures must restore them to their original standard construction specifications.

E. Special Structure Maintenance

Structures such as waterbars, culverts, switchbacks, retaining walls, wash crossings, overpasses, bridges, etc. are rather expensive and labor intensive to construct. Proper maintenance will prolong the life of the structures and help prevent safety hazards. All repairs to special structures must restore them to their original standard construction specifications.

G. Emergency Access

The Trail shall be cleared and maintained in a manner that ensures that emergency (police and fire) vehicles have access to the Trail. Emergency access for safety, security, or maintenance purposes is based on an established protocol between the parks, fire and police departments. Protocol will be developed along with an

Emergency Plan that will be developed by each department. The initial responding party will notify the other departments as soon as possible. If removable bollards are installed all appropriate police and fire personnel shall have the keys for access.

8.6 Operation and Maintenance Plan

Maintenance plans and policies are one of the primary ways to limit hazards and lawsuits, as well as ensure a trail system remains attractive and usable. Periodic inspections, documentation of hazards and remedies, and maintenance activities should all be part of a well-rounded plan. Carlsbad Operations and Maintenance Plan (OMP) includes the following:

- Contact information for trail managers, organizations, and/or volunteers responsible for maintaining the trail system.
- Written inspection and maintenance policies that include tasks, timeframes and responsible parties.
- Inspection forms that document date, time, person/group, trail condition, hazards and other pertinent information, see Table 8.2.
- Trail maintenance schedule that identifies timeframes for regularly-scheduled maintenance activities such as pruning, trash pick-up and fixing potholes or erosion, see Table 8.1.
- List of constructed features, such as bridges, culverts and fences that require regular inspection and maintenance.

The following are included in the OMP:

- List of personnel with keys to locked gates and bollards;
- list of locked access points and how they are locked;
- plans for quickly dealing with unexpected events such as storm damage;
- daytime and nighttime contact information for trail managers;
- contact information for any local or state or violation information, including local law enforcement, fire and other first responders, both emergency and nonemergency contacts;
- CA Department of Fish and Wildlife (poaching, unlicensed fishing); and
- animal control or shelters (loose or lost pets).

8.7 Safety and Enforcement

To minimize liability, it is critical to adhere to established standards in trail design, signage, and maintenance. California State Statute 831.4 provides for substantial immunity to public agencies that construct and operate trails in accordance with widely accepted standards or guidelines, such as the California State Parks Trail Design and Maintenance Guidelines. Measures listed to minimize liability include:

- Post trail regulations and provide enforcement.
- Post warning signs for known hazards that are not easily identified
- Keep accurate routine maintenance records.
- Inspect the trail regularly for hazards;
- Evaluate and address hazards and maintenance problems reported by trail users with appropriate measures as soon as possible.
- Ensure that there are adequate emergency access points to the trail along its entire corridor.

Safety of trail users must be paramount in priorities. This section describes basic safety elements that need to be reviewed and encouraged. This section also looks at some of the management strategies to ensure that trail users are following the regulations necessary to protect other users and resources found along the trail.

Utilize a Trail I.D. System

Trail Identification Signs have been placed at trailheads that correspond with GPS Coordinates that have been mapped by the city's GIS staff and provided to Police and Fire . Trail names and corresponding GPS coordinates are effective in assisting fire and safety personnel in locating trail users who may need assistance in emergencies. Trail identifications are also useful for maintenance staff to locate trail maintenance areas on some of the longer trail systems, such as at Lake Calavera, Hosp Grove and the Rancho La Costa preserve. These trail head signs also indicate trail difficulty, length, surface type and are typically posted along with the trail rules and regulations,. Some systems include distance markers or other signage indicating where trail users are located in relation to trail heads or access points.

Develop an Emergency Response Plan

Emergency response plans clearly indicate how emergency situations, such as injured, lost hikers, or stranded cyclists, can be assisted. While not every emergency can be imagined and there will be unforeseen instances, having a plan that covers typical emergencies will go a long way to providing care for trail users and limiting liability. Emergency response plans should include the following:

- Emergency contact information for local police, hospitals, fire, and rescue agencies.
- Emergency contact information for specialized services such as search-and-rescue groups, tow trucks, and helicopter services.
- 24-hour contact information for trail managers or responsible trail organizations.
- Identification of all potential trail or path access points, the limitations of each access point (vehicle size, difficult terrain, etc.), list of personnel responsible for keys to any locks at any locked access point.
- Inclement weather plans for closing sections of trail that may be hazardous during events such as storms. These plans should also include evacuation methods to use during an emergency.

Monitor the Trail System

Monitoring or policing is a general term for actively watching over trail users and activities and may be accomplished by local law enforcement, volunteer safety patrols and other trail users. The Rails-to-Trails Conservancy recommends that local law enforcement agencies tasked to monitor trails do so on bicycles rather than in cars or ATVs. Bicycle-mounted police have more maneuverability, lower associated costs, do less damage to trails, and tend to have better public relations.

Volunteer safety patrols consist of volunteers who walk, bike or ride trails and paths and watch for trail violations or users in need of assistance. This practice is fairly common in the State Park system, for instance, and can be adapted to any type of trail system. The International Mountain Bicycling Association's (IMBA) Managing Mountain Biking: IMBA's Guide to Providing Great Riding offers "10 Traits of Highly Successful Patrols," useful information for anyone interested in starting or enhancing a trail or path safety patrol.

The following tips are adapted from IMBA's text. Safety patrols should:

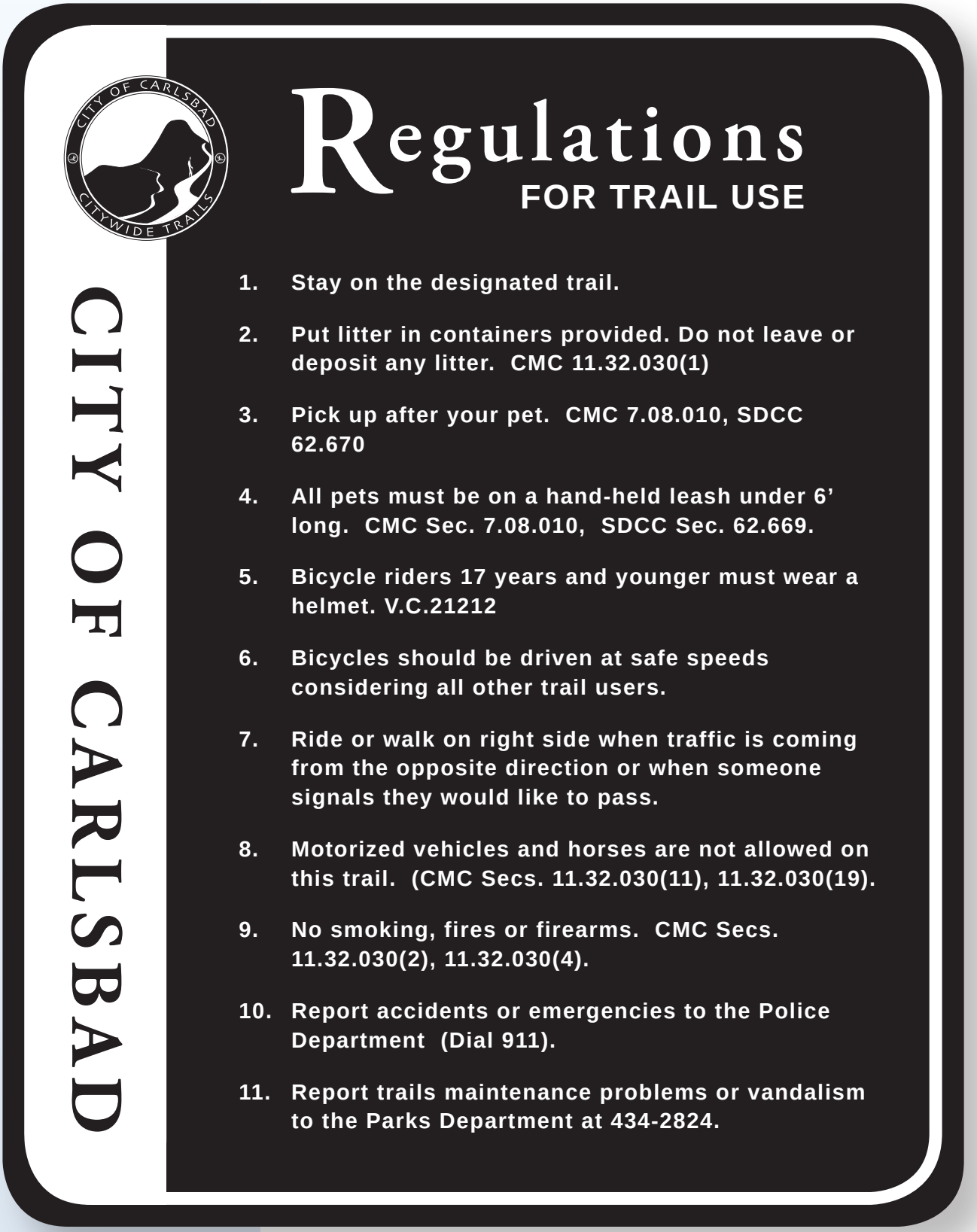
- Be professional and organized;
- communicate through meetings, websites and newsletters;
- consider using volunteers who are part of the trail community;
- offer training in public engagement, first-aid and risk management;
- dress to be visible and recognizable on the trail;
- engage in community activities;
- partner with local emergency services;
- manage volunteers effectively;
- engage the media in a positive manner;
- fund-raise to support patrol activities and purchases; and
- make training and patrols interesting and fun.

Enforce of Rules and Regulations

Rules and regulations are useful to deter unlawful and undesirable activity on trail systems. While the majority of visitors who read rules and regulations will abide by them, enforcement may be necessary to promote the safety and enjoyment of all users. In most cases, professional law enforcement officers are responsible for issuing citations for legal violations such as littering, after hours use and unauthorized vehicle use. While volunteer patrols cannot enforce laws, they can aid law enforcement officers by noting and calling in criminal activity and providing emergency relief until professionals arrive. Patrol members should be trained to understand the extent of their enforcement capabilities and how to contact the proper authorities.

8.8 Trail Volunteer Programs

Volunteers fill many different positions throughout the city, and volunteer groups also assist the Parks & Recreation Maintenance Department with Carlsbad's trails. Trails volunteers perform trails maintenance and assist with trails improvements such as installation of directional and interpretive signage, kiosks and other trails amenities. Volunteers play a vital role in the construction of new trails throughout the city. In Carlsbad the two primary volunteer programs include the Citywide Trails Program and Adopt-a-Trail Program. Management responsibilities are outlined and agreed upon by those who sign up to volunteer. The city's Second Saturday trail work events are very popular and enlist hundreds of volunteer throughout the year to assist in new trail building as well as many other important tasks associated with keeping the trails safe and enjoyable for residents and visitors alike. In addition to the city's trial volunteers, the 3 lagoon foundations also have ongoing trail volunteer programs and training at their respective nature centers. To be a city trails volunteer, you must submit an application with the Community Volunteer Coordinator and attend a mandatory volunteer orientation. Visit the City's website at www.Carlsbadca.gov/trails for more information on the City's Trail Volunteer Program.



Standard Trail Regulation Sign

Chapter 9

Funding Opportunities

9 Funding Opportunities

In general, Carlsbad has funded the majority of its trail systems by way of private developer dedications and permit requirements. Although this methodology will continue into the future, the ultimate number of new developments is finite and other sources of funding will be needed, especially for existing built areas of the city. This chapter identifies a broad range of funding sources and grant programs that could assist to the City of Carlsbad and its expanding trail system.

9.1 General Funding Framework

Under current competitive grant programs, it is imperative that organizations seeking grants look well beyond the traditional recreational trail grant sources. Many organizations and agencies are trying to stretch their general development funds through grant funding. The competitive nature of grant awards these days, requires a project that will deliver multiple benefits. The following pertinent categories or criteria are listed in the funding matrix table (see "Table 9.1: Federal Funding Grant Sources", "Table 9.2: State Funding Grant Sources", and "Table 9.3: Regional / Local Funding Grant Sources") and are represented by the following terms and icons:

Urban Forestry:
The types of grants that can be obtained require the applicant to show how the project and its elements can use trees to improve air quality, shade, urban heat island reduction, traffic calming, water quality improvements, runoff control, windbreaks and the protection of pedestrian environments.

Building Healthy Communities:
Facilities that allow for exercise for the general public to improve their overall health, including both physical and mental health benefits.

Nature Education:
Trail projects that improve access to nature, appreciation of undisturbed wildlands and the encouragement of activity in natural settings fall under this category.

Habitat Protection:
Trail projects that are part of a preserve system that can serve to protect, preserve, enhance, restore or provide education about the city's habitat preserves are included in this category.

Water Quality:
Trail projects that include protection of watersheds, creeks, streams, rivers, wetlands and the city's three lagoons fall into this category. This category includes water conservation as well as water quality improvements.

Active Transportation:
Transportation projects that address congestion, reduction of auto trips, greenhouse gas emissions, bike use, bike safety, bike education, pedestrian facilities, pedestrian safety and education, as well as improved connections with bike or walking facilities.

9.2 Federal Funding Opportunities

Federal funding is sometimes administered through the state (Caltrans and the State Resources Agency) and regional planning agencies. Many of these funding programs are oriented toward transportation, with an emphasis on reducing auto trips and providing inter-modal connections. Federal funding is intended for capital improvements safety education programs, and projects related to the transportation system. Some of the most relevant Federal grant programs have been listed below. Not all grants listed on the tables at the end of the chapter have been included in the text descriptions below.

In July 2012, Congress passed a transportation bill: Moving Ahead for Progress in the 21st Century (MAP-21). Since October 2012, Safe Routes to School (SRTS) activities have been eligible to compete for funding alongside other programs, including the Transportation Enhancements program and Recreational Trails program, as part of a new program called Transportation Alternatives.

Land and Water Conservation Fund (LWCF)

This program (LWCF) provides grants for planning and acquiring outdoor recreation areas and facilities, including trails. LWCF is administered by the National Parks Service and the California Department of Parks and Recreation and has been reauthorized until 2015. Cities, counties and districts authorized to acquire, develop, operate and maintain park and recreation facilities are eligible to apply. Applicants must fund the entire project and will be reimbursed for fifty percent of costs.

Eligible project must meet two specific criteria. The first is that projects acquired or developed under the program must be primarily for recreational use and not transportation purposes, and the second is that the lead agency must guarantee to maintain the facility in perpetuity for public recreation. Applications are considered using criteria such as priority status within the State Comprehensive Outdoor Recreation Plan (SCORP). The State Department of Park and Recreation will select which projects to submit to the National Park Service (NPS) for approval. Final approval is based on the amount of funds available that year, which is determined by a population-based formula. Trails are the most commonly approved project. The grant process for local agencies is competitive, and 40 percent of grants are reserved for northern California.

Federal Lands Highway Funds

This program's (FLH) funds may be used to build bicycle and pedestrian facilities in conjunction with transit, roads and parkways on federal or Indian lands. The projects must be transportation-related and tied to a plan adopted by the state and local metropolitan planning organization. FLH funds may be used for planning and construction.

Highway Safety Improvement Program (HSIP)

Administered by Caltrans, these program funds are intended to help achieve a significant reduction in traffic fatalities and serious injuries on public roads. HSIP requires Caltrans to develop and implement a Strategic Highway Safety Plan (SHSP) that identifies improvements. Caltrans sets aside funds for construction and operational improvements on high-risk rural roads and may use the remainder of funds for bicycle and pedestrian pathways or trails and education and enforcement. Previous application deadlines have been in October.

Transportation Alternatives Grant Program

In July 2012, Congress passed Moving Ahead for Progress in the 21st Century (MAP-21). Since October 2012, Safe Routes to School (SRTS) activities have been eligible to compete for funding alongside other programs, including the Transportation Enhancements program and Recreational Trails program, as part of a new program called Transportation Alternatives.

The RTP provides funds annually for recreational trails and trails-related projects. The RTP is administered at the federal level by the Federal Highway Administration (FHWA) and at the state level by the California State Parks and Recreation Office of Grants and Locals Services (OGALS). MAP-21 did not directly amend the RTP as a program, but authorized its funding as a set-aside of the new Transportation Alternatives Program (TA).

Funding for the Transportation Alternatives program is derived from a number of former programs previously funded under the Transportation Enhancements, Recreational Trails and Safe Routes to School programs under SAFETEA-LU. Under MAP-21, states sub-allocate 50 percent of their Transportation Alternatives (TA) funds to MPOs and local communities to administer grant programs and to distribute funds for projects. States can use the remaining 50 percent for TA projects or can spend these funds on other transportation priorities.

Rivers, Trails and Conservation Assistance Program (RTCA)

This program (RTCA) is a National Park Service program that provides technical assistance via direct staff involvement to establish and restore greenways, rivers, trails, watersheds and open space. The RTCA program provides planning assistance only. Projects are prioritized for assistance based upon criteria that include conserving significant community resources, fostering cooperation between agencies, serving a large number of users, encouraging public involvement in planning and implementation and focusing on lasting accomplishments. Federal agencies may be the lead partner only in collaboration with a non-federal partner.

Various Grants from Housing and Urban Development (HUD)

HUD grant programs change from year to year depending on congressional funding levels. Sometimes these programs are in conjunction with Federal EPA and the Department of Transportation. They have included such sources and grant titles as Choice Neighborhoods Planning Grants; Sustainable Communities Planning Grant and Incentive Program, and the Urban Revitalization and Livable Communities Act.

ACHIEVE, Communities Putting Prevention to Work

Chronic diseases are among the most common and costly of all health problems in the United States, but they also are among the most preventable. Lack of physical activity and poor nutrition—two modifiable risk factors for obesity—and tobacco use are responsible for much of the illness, suffering, and death related to chronic diseases. To help address these health issues, the U.S. Department of Health and Human Services (HHS) created Communities Putting Prevention to Work (CPPW), which is led by the Centers for Disease Control and Prevention (CDC). Through CPPW, communities—including urban, small, rural, and tribal areas—are implementing environmental changes to make healthy living easier, such as improving means for safe active transportation for pedestrians, bicyclists, and mass transit users; ensuring provision of healthy food and beverage options in schools; limiting exposure to secondhand smoke; and increasing available tobacco cessation resources.

9.3 State Funding Opportunities

State funding for trail projects comes from a variety of sources, including federal allocations to state governments and voter-approved bonds. State of California agencies typically charged with administering these funds include Caltrans and State Parks Office of Grants and Local Services (OGALS).

Statewide Park and Community Revitalization Program

This program provides competitive grants for new parks and recreational facilities for the most under served communities in California. Neighborhood and regional trails are eligible for the grant program. Grants from $100,000 to $5,000,000 are awarded and no local matching funds are required. This grant is administered through the California Department of Parks and Recreation through OGALS.

Land and Water Conservation Fund

This California Parks and Recreation grant typically allocates $3-4 million statewide awarded annually for trail projects that benefit public land and water conservation projects. A maximum award request is for projects of $2,000,000 or less.

Habitat Conservation Funds (HCF)

Authorized by the California Wildlife Protection Act in 1990, Habitat Conservation Funds can be used for the construction of trails for the purpose of protecting wildlife corridors. The program allocates $2,000,000 per year to the California Department of Parks and Recreation to administer to public agencies. This program sunsets in FY 2019/20. Eligible projects include nature interpretation programs to bring urban residents into park and wildlife areas, protection of various plant and animal species, and acquisition and development of wildlife corridors and trails.

California Park Propositions

The following proposition based initiatives are administered through the California Department of Parks and Recreation:

On March 7, 2000, voters passed Proposition 12 by 63.2 percent, the $2.1 billion "Safe Neighborhood Parks, Clean Water, Clean Air and Coastal Protection Bond Act of 2000" (2000 Bond Act). As passed, this bond act provided funds for local assistance grants.

On March 5, 2002, voters passed Proposition 40 by 56.8 percent, the $2.6 billion "California Clean Water, Clean Air, Safe Neighborhood Parks, and Coastal Protection Act of 2002" (2002 Resources Bond). The passage of Proposition 40 provided funds for local assistance grants.

Environmental Enhancement and Mitigation Program (EEMP)

This program (EEMP) provides grant opportunities for projects that indirectly mitigate environmental impacts of new transportation facilities. Projects should fall into one of the following three categories: highway landscaping and urban forestry, resource lands projects or roadside recreation facilities. The local Caltrans district must support the project. The program is administered by SANDAG.

Public Access Development Program

This program handled through the California Wildlife Conservation Board funds land acquisitions that preserve wildlife habitat or provides recreational access for hunting, fishing or other wildlife-oriented activities. Up to $250,000 is available per project with applications accepted quarterly. Eligible projects include interpretive trails, river access and trailhead parking areas. The state must have a proprietary interest in the project. Local agencies are generally responsible for the planning and engineering phases.

Coastal Conservancy Grants

To achieve its goals, the Coastal Conservancy awards grants to public agencies and nonprofit organizations. Some examples of the kinds of projects the Coastal Conservancy funds include trails and other public access to and along the coast, natural resource protection and restoration in the coastal zone or affecting coastal areas, restoration of coastal urban waterfronts, protection of coastal agricultural land, and resolution of land use conflicts.

California River Parkways and Urban Streams Restoration Grant

The goal of this program is to provide recreational, wildlife, flood management, water quality and urban waterfront revitalization benefits to communities along river corridors. The grant is administered by the CA Dept. of Water Resources. Trail-related projects are a strong component of the program by achieving recreation, interpretation and potentially conversion of abandoned industrial lands goals. Public access is a fundamental requirement of the program.

Sustainable Communities (Sustainable Transportation Planning Grants)

This fund, administered by Caltrans, provides funding for innovative planning projects that exemplify livable community concepts including bicycle and pedestrian improvement projects. Eligible applicants include local governments, metropolitan planning organizations and regional transportation planning agencies. A 10 percent local match is required and projects must demonstrate a transportation component or objective. Statewide, $3 million is available annually.

Bicycle Transportation Account (BTA)

Caltrans administers the Bicycle Transportation Account (BTA), state funding for local planning and construction projects that improve the safety and convenience of bicycling for transportation (e.g., bikeways accessing schools, employment centers and transit). Applicants must have an approved Bicycle Transportation Plan (BTP) and their project must meet Caltrans Highway Design Manual (HDM) Chapter 1000 requirements and California Manual of Uniform Traffic Control Devices (CAMUTCD) standards.

Recreational Trails Program (RTP) Funding Update

Recently, the Governor signed legislation that creates the new Active Transportation Program (to be administered by Caltrans), and enables a portion of the RTP funding to remain with the California Department of Parks and Recreation.

Active Transportation Program (ATP)

The State of California created the Active Transportation Program (ATP) with Senate Bill 99 and Assembly Bill 101. This program is intended to encourage increased use of active modes of transportation and consolidates various federal and state transportation programs, including the Transportation Alternatives Program, Bicycle Transportation Account, and State Safe Routes to School into a single program. Program funding will be awarded both in a statewide and regional competition. Approximately $360 million statewide has been budgeted for the ATP over three years, beginning with FY 2014. Approximately $60 million per year will be competitively awarded for projects selected by the California Transportation Commission. Of this, $24 million per year is available for Safe Routes to School, with at least $7.2 million for non-infrastructure grants.

9.4 Regional Funding Sources

Local sources for trail implementation come from local and state sales tax revenues that are administered locally through regional governments such as SANDAG or local districts such as Caltrans District 11. Other sources of local funding include private investments from developers or public investments from the City of Carlsbad.

Transportation Development Act

Transportation Development Act Article III funds are state block grants awarded monthly to local jurisdictions for transit, bicycle and pedestrian projects in California. Funds for pedestrian projects originate from Local Transportation Funds (LTF), which are derived from a quarter percent of the general state sales tax. LTF are returned to each county based on sales tax revenues. Article 3 of the Transportation Development Act sets aside two percent of LTF for bicycle and pedestrian projects. Eligible trail projects include construction and engineering for capital projects, maintenance of bikeways and development of comprehensive bicycle or pedestrian facilities plans. This program is administered through both SANDAG and Caltrans.

Regional Grants from SANDAG

SANDAG, as the local metropolitan planning organization for San Diego County, is responsible for several grant programs that have some relevance for trails used for transportation purposes. Beyond Transnet based program funding in the Regional Transportation Plan (RTP), the Regional Transportation Improvement Program (RTIP) and the Smart Growth Incentive Program, SANDAG administers the Active Transportation Program and the Healthy Works / Communities Putting Prevention to Work (CPPW) grant program. Also, depending on the project type, trails and habitat restoration projects could qualify under the Transnet Environmental Mitigation Program.

9.5 Local Funding Sources

A variety of local funding sources has been listed under the City of Carlsbad or through the development review and approval process involving local landowners and developer. A special consideration for Carlsbad is Proposition “C”. In 2002, voters passed Proposition C, which allowed the City Council to exceed a $1 million amount on four projects: the City of Carlsbad Safety Training Center, a new swimming pool complex (Alga Norte Community Park), an extension of Cannon Road, and acquisition of open space and trails. Proposition C did not direct the City Council to spend a specific amount of money on open space and trails by a certain time. Instead, it provided voter authorization to spend more than the $1 million limit if one or more properties became available and the city felt it was in the taxpayers’ best interest to purchase it for open space/trails purposes.

9.6 Non-Traditional Sources

American Greenways Program

Administered by The Conservation Fund, this program provides funding for the planning and design of greenways and unpaved trail development. Eligible applicants include local, regional or statewide non-profit organizations and public agencies. Grants are small. The maximum award is $2,500, but awards typically range from $500 to $1,500.

Bikes Belong Grant

Bikes Belong is an organization sponsored by bicycle manufacturers with the intent to increase bicycle riding in the United States. Bikes Belong provides grant opportunities of up to $10,000, with no required match, to organizations and agencies seeking to support bicycle facility and advocacy efforts. Eligible projects include paved bicycle paths, rails-to-trails and mountain bike trails.

Health Care Organizations

Health care organizations have been partnering with public agencies and municipalities for funding projects that provide opportunities and facilities that encourage people to engage in more physical activity. An example is Kaiser Permanente's Community Benefit program, which provided over $634 million in 2010 funding and grants for programs to support healthy people and healthy living.

California Conservation Corps (CCC)

California Conservation Corps (CCC) is a public service program employing youth in natural resource work that occasionally provides assistance on construction projects. The CCC may be written into grant applications as a project partner, but to utilize CCC labor, project sites must be public land or be publicly accessible. CCC labor cannot be used to perform regular maintenance, but it can perform annual maintenance, such as the opening of trails in the spring.

9.7 Funding Matrix

The following three tables show how the various funding sources may be applicable for park lands acquisition, trail development or the maintenance and operations of trails. The table also ranks the grants based on the planning and transportation trends that many of these grants strive for in their application ranking process. There are many more sources than shown on these tables and some may or may not be applicable for trails. The relevance will depend on if the trails have a transportation component to them, if they will improve environmental conditions, public safety or the general health of the community.

Table 9.1: Federal Funding Grant Sources

CARLSBAD TRAILS MASTER PLAN		FUNDING USES									
		TYPICAL APPROACHES			ATYPICAL APPROACHES						
FUNDING SOURCE	FUNDING ORIGIN	Park Land Acquisition	Trail Development	Maint. & Operations	Urban Forestry	Building Health Communities	Nature Education	Habitat Protection	Water Quality	Active Transport
Federal Funding Sources										
Land and Water Conservation Fund (LCWF)	U.S. National Park Service/California Dept. of Parks & Rec.	✔	✔				✔	✔	✔	
Federal Lands Highway Funds	U.S. FHWA		✔							✔
Highway Safety Improvement Program- Transportation Alternatives Grant	U.S. FHWA		✔			✔				✔
Recreational Trails Program- Transportation Alternatives Grant	U.S. FHWA		✔				✔			
Safe Routes to School, Mini-grants- Transportation Alternatives Grant	National Center for Safe Routes to School & Caltrans / U.S. FHWA		✔			✔				✔
Sustainable Communities Planning Grant and Incentive Program	U.S. Dept. of Housing and Urban Development (HUD)	✔				✔		✔	✔	✔
Urban Revitalization & Livable Communities Act	U.S. Dept. of Housing and Urban Development (HUD)	✔			✔	✔	✔	✔	✔	✔
ACHIEVE, Communities Putting Prevention to Work, Pioneering Communities	Center for Disease Control & Prevention			✔		✔	✔			✔

Table 9.2: State Funding Grant Sources

CARLSBAD TRAILS MASTER PLAN		FUNDING USES									
		TYPICAL APPROACHES			ATYPICAL APPROACHES						
FUNDING SOURCE	FUNDING ORIGIN	Park Land Acquisition	Trail Development	Maint. & Operations	Urban Forestry	Building Health Communities	Nature Education	Habitat Protection	Water Quality	Active Transport
State Funding Sources										
Statewide Park & Community Revitalization	CA Dept. of Parks & Rec. (OGALS)	✔					✔	✔	✔	
Land and Water Conservation Fund	CA Dept. of Parks & Rec. (OGALS)	✔					✔	✔	✔	
Habitat Conservation Funds	CA Dept. of Parks & Rec. (OGALS)	✔	✔				✔	✔		
Proposition 12 - 2000 Parks Bond Act	CA Dept. of Parks & Rec. (OGALS)	✔	✔		✔	✔	✔	✔		
Proposition 40 - 2002 Resources Bond	CA Dept. of Parks & Rec. (OGALS)	✔	✔				✔	✔		
Recreational Trails Program	CA Dept. of Parks & Rec. (OGALS)		✔	✔		✔	✔		✔	✔
Proposition 117 - Habitat Conservation	CA Dept. of Parks & Rec. (OGALS)	✔	✔		✔		✔	✔	✔	
Watershed Program	CA Dept. of Parks & Rec. (OGALS)	✔	✔		✔		✔		✔	
Stormwater Flood Management Prop. 1E	CA Dept. of Water Resources		✔		✔		✔		✔	
Environmental Enhancement & Mitigation Program (EEMP)	State Resources Agency / Natural Resources Agency / Dept. of Water		✔				✔	✔	✔	
Public Access Development Program	Wildlife Conservation Board	✔	✔				✔	✔	✔	
Coastal Conservancy Grants	CA Coastal Conservancy	✔	✔		✔	✔	✔	✔	✔	✔
California River Parkways & Urban Streams Restoration Grant	California Natural Resources Agency / Department of Water Resources		✔	✔			✔	✔	✔	
Sustainable Communities (STPC)	Caltrans		✔		✔	✔	✔		✔	✔
Statewide Active Transportation Funding	Caltrans		✔			✔				✔
Bicycle Transportation Account	Caltrans		✔			✔				✔
Traffic Safety Grants	Office of Traffic Safety		✔			✔				✔
Sustainable Communities Planning, Regional SB 375	Strategic Growth Council/Dept. of Conservation	✔	✔	✔	✔	✔				✔

Table 9.3: Regional / Local Funding Grant Sources

CARLSBAD TRAILS MASTER PLAN		FUNDING USES								
		TYPICAL APPROACHES			ATYPICAL APPROACHES					
FUNDING SOURCE	FUNDING ORIGIN	Park Land Acquisition	Trail Development	Maint. & Operations	Urban Forestry	Building Health Communities	Nature Education	Habitat Protection	Water Quality	Active Transport
Regional Funding Sources										
Transportation Development Act	SANDAG / Caltrans		✔							✔
Transnet Sales Tax Transportation Funding-Environmental Mitigation	SANDAG		✔			✔	✔	✔	✔	✔
Smart Growth Planning & Construction Grants	SANDAG		✔		✔	✔	✔			✔
Active Transportation Grants	SANDAG		✔			✔				✔
Healthy Works / Communities Putting Prevention to Work	SANDAG		✔			✔	✔			✔
Local Funding Sources										
Proposition "C"	City of Carlsbad	✔	✔			✔	✔	✔		✔
Utility Easement Agreements / Revenues	City of Carlsbad	✔	✔	✔		✔				✔
General Fund	City of Carlsbad	✔	✔	✔	✔	✔	✔	✔	✔	✔
Land / Facilities Dedication	City of Carlsbad / Developers	✔	✔			✔		✔	✔	✔
Right of Way / Easement Dedications	City of Carlsbad / Developers		✔		✔	✔	✔	✔	✔	✔
Park Dedication Fees	City of Carlsbad / Developers	✔	✔		✔	✔	✔	✔	✔	✔
Park Impact Fees	City of Carlsbad / Developers	✔	✔	✔	✔	✔	✔	✔	✔	✔
Private Development Agreements & Easements	City of Carlsbad / Developers	✔	✔	✔	✔	✔	✔	✔	✔	✔
Non-Traditional Sources										
American Greensway Program	The Conservation Fund	✔	✔	✔			✔			✔
Bikes Belong Grant	Bicycle Manufacturers of America		✔			✔	✔			✔
Health Care Organizations	Varies					✔				✔
California Conservation Corps Labor Grants	California Conservation Corps			✔	✔		✔	✔	✔	